THE

AMERICAN GAS-LIGHT JOURNAL.

THE OFFICIAL GAZETTE OF

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VOL. IV.—No. 67. NEW-YORK, WEDNESDAY, OCTOBER 1, 1862. $3 PER ANNUM.

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Herring's Patent Fire and Burglar-Proof Safes *combined*, (one Safe within another,) making the most perfect protection from fire and thieves now known.

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WELLSBORO', Penn., December 21, 1861.

Messrs. Herring & Co., New York:

Gentlemen,—At the great fire which occurred here on the 18th December last, my store, with a number of other buildings, was entirely destroyed; no less than seven places of business were burnt out and five of your safes severely tested, in every instance saving their entire contents, to the complete and perfect satisfaction of the owners. Two of your Herring's Patent Champion Safes which were in my building remained there through the entire conflagration, and were not opened until the day after the fire. No water was thrown on the building. Everything in my safe after the fire was nearly as good as new. C. L. Wilcox also preserved all his books, papers, and money in two of your safes, both being in same fire. Wm. Roberts was also the fortunate owner of another of your Patent Champion Safes, which was severely tested, and saved completely his books, papers, and money. The result has given great satisfaction, and we want no safe but Herring's Champion. Please send me one same size I last bought of you immediately. Send by N. Y. & Erie R.R. via Tioga depot. JOHN R. BOWEN.

I had two of Herring's Safes in above fire. They saved my books, papers, and $2,000 *in bank bills*. C. L. WILCOX.

HERRING'S PATENT CHAMPION saved my books, papers, and about $400 in *paper money*. I would use no other. WILLIAM ROBERTS.

GREAT FIRE IN PEARL AND FULTON STS.

NEW YORK, Jan. 27, 1862.

MESSRS. HERRING & Co., No. 251 Broadway:

Gentlemen,—The large HERRING'S PATENT CHAMPION SAFE you made for me a few years ago has been put to a severe test in the great fire corner Fulton and Pearl sts., on the 20th inst., which entirely destroyed my building, together with many others.

The fire commenced about 6 o'clock on Sunday morning, and the safe was taken from the ruins after an exposure of more than thirty hours.

Your Safe contained all my books, insurance policies, and other valuable papers besides, gold and silver, bank bills, coupon bonds, &c., amounting to over Two Hundred Thousand Dollars. Everything in the Safe is in perfect order, except the binding of the books being steamed.

Your Patent Champion Safe gives us great satisfaction, and has guarded safely through the fire every dollar of its contents.

Truly yours, A. S. FOSTER.

GREAT FIRE IN NEW JERSEY.

NEW BRUNSWICK, N. J., January 18th, 1862.

MESSRS. HERRING & Co.,

No. 251 Broadway, New York:

Gentlemen,—At the recent extensive fire in our city, on Wednesday morning last, 15th inst., I was the fortunate owner of one of your HERRING'S PATENT CHAMPION SAFES, which contained some books and a number of valuable papers.

The heat in my store was very great, and the safe subject to an intense heat. I felt great interest in the safety of my papers, as a number of castings in my store and within a few feet of the safe were melted. Nothing, indeed, was saved in my building, except the contents of your safe, which I am happy to inform you was completely preserved, after a thorough roasting for some seventeen hours. The result has exceeded my anticipations, and fully confirmed my confidence in the security of your Herring's Patent Safe. Please send me another of larger size, and refer all incredulous to my books and papers, which it gives me great pleasure to show.

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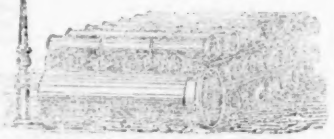

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PATENT-OFFICE NOTICES.

UNITED STATES PATENT-OFFICE,
WASHINGTON, April 17, 1862.

ON THE PETITION OF PHEBE Ann Fisk, Executrix, &c., of Almond D. Fisk, late of the City, County, and State of New York, praying for the extension of a Patent granted to the late Almond D. Fisk, Nov. 14, 1848, and re-issued March 6, 1860, for an improvement in Coffins, for seven years from the expiration of said Patent, which takes place on the 14th day of November, 1862.

It is ordered that the said petition be heard at the Patent-Office on Monday, the 27th of October next, at 12 o'clock m.; and all persons are notified to appear and show cause, if any they have, why said petition ought not to be granted.

Persons opposing the extension are required to file in the Patent-Office their objections specially set forth in writing at least twenty days before the day of hearing; all testimony filed by either party to be used at the said hearing must be taken and transmitted in accordance with the rules of the office, which will be furnished on application.

The testimony in the case will be closed on the 13th of October next; depositions and other papers relied upon as testimony, must be filed in the office on or before the morning of that day; the arguments, if any, within ten days thereafter.

Ordered, also, that this notice be published in the "National Republican," Washington, D. C., and "Tribune," New York, N. Y., once a week for three successive weeks; the first of said publications to be at least sixty days previous to the day of hearing. D. P HOLLOWAY,
Commissioner of Patents.

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VIRGINIA.

147 Counties, 1,785 Towns, 11 Gas-Works, 5 Water-Works.

(*Concluded from page 83.*)

Page County.

Alma,	Hope Mills,	Massanutton,
Cedar Point,	Leaksville,	Shenandoah IronW'ks
East Liberty,	*Luray*, (c. h.,)	Stoney Man,
Grove Hill,	Marksville,	Valleyburgh.

Pendleton County.

Dry Run,	Mount Freedom,	Sugar Grove,
Franklin, (c. h.,)	Mouth of Seneca,	Sweedlin Hill,
Harper's Mills,	Oak Flat,	Upper Tract.

Pittsylvania County.

Aspen Grove,	Crafton,	Pleasant Gap,
Axton,	Danville,	Riceville,
Bachelor's Hall,	Glady Fork,	Ringgold,
Berger's Store,	Hill Grove,	Sandy Level,
Calland's,	Laurel Grove,	Sandy River,
Cartersburgh,	Mount Airy,	Spring Garden,
Cascade,	Museville,	Swansonville,
Chalk Level,	Peytonsburgh,	Whitmell.
	Pittsylvania C. H.,	

Plesants County.

Grape Island,	Hebron,	Willow Island.
	Saint Marys, (c. h.,)	

Pocahontas County.

Academy,	Green Bank,	Mount Murphy,
Big Spring,	*Huntersville*, (c. h.,)	Oldfield Fork of Elk,
Dunmore,	Marlin Bottom,	Sunset,
Edray,	Mill Point,	Thorny Creek,
Frost,		Traveller's Repose.

Powhatan County.

Ballsville,	Hallsboro',	Powhattan C. H.,
Fine Creek Mills,	Jefferson,	Smithsville,
Genito,	Macon,	Sublett's Tavern.

Preston County.

Allbright,	Gladesville,	Farinton,
Amblersburgh,	Greensburg,	Racoon,
Brandonville,	Guseman's Store,	Reidsville,
Bruceton Mills,	Horse Shoe Run,	Rowlesburgh,
Cranesville,	*Kingwood*, (c. h.,)	Saltlick Falls,
Evansville,	Masontown,	Springdale,
Fellowsville,	Muddy Creek,	Tannery,
German Settlement,	Newburgh,	Tunnelton,
Glade Farms,		Valley Point.

Prince Edward County.

Darlington Heights,	Hampden Sidney	Prince Edward C. H.,
Farmville,	College,	Prospect,
Green Bay,	Moore's Ordinary,	Rice Depot.
	Pamplin's Depot,	

Prince George County.

Brandon Church,	Disputanto,	Prince George C. H.,
City Point,	Garysville,	Templeton.

Princess Anne County.

Blossom Hill,	Kempsville,	Pleasant Ridge,
Ives' Store,	Land of Promise,	Princess Anne C. H.
	London Bridge,	

Prince William County.

Brentsville,	Gainesville,	Maple Valley,
Bristoe Station,	Groveton,	Neabsco Mills,
Buckland,	Hay Market,	Occoquan,
Dumfries,	Independent Hill,	Thoroughfare,
Evansport,	Landsdown,	Tudor Hall.

Pulaski County.

Draper's Valley,	*Newbern*, (c. h.,)	Poplar Hill,
Dublin,		Snowville.

Putnam County.

Buffalo,	Mount Salem,	Sycamore Grove,
Frazier Bottom,	Mouth of Poca,	Teaze's Valley,
Hensonville,	Red House Shoals,	Walnut Grove,
Hurricane Bridge,		Winfield.

Raleigh County.

Coal River Marshes,	Raleigh C. H.,	Shady Spring,
Jarrold's Valley,	Richman Falls,	Table Rock.
	Round Glade,	

Randolph County.

Beverly, (c. h.,)	Middle Fork,	Red Creek,
Dry Fork,	Mingo Flat,	Roaring Creek,
Fillmore,	New Interest,	Salina,
Huttonsville,	Queen's Mills,	Upper Cheat
Leadsville,		Valley Head.

Rappahannock County.

Amissville,	Laurel Mills,	Sperryville,
Flint Mill,	Rock Mills,	*Washington* (c. h.,)
Gaines' Cross Roads,	Sandy Hook,	Woodville.
	Slate Mills,	

Richmond County.

Durrettsville,	Farnham,	*Warsaw* (c. h.)
	Stony Hill,	

Ritchie County.

Bone Creek,	Highland,	Petroleum,
Cairo,	Molehill,	Ritchie C. H.,
Cornwallis,	Oxford,	Rusk,
Ellenborough,	Pennsboro',	Webb's Mills,
Goose Creek,		White Oak.

Roane County.

Henries' Fork,	Roxalana,	Spencer,
Reedyville,		Walton.

Roanoke County.

Bent Mountain,	Bonsack's,	Gishe's Mills,
Big Lick,	Botetourt Springs,	*Salem*, (c. h.)
	Cave Spring,	

Rockbridge County.

Alone,	Fancy Hill,	Monmouth,
Alum Springs,	Gilmore's Mills,	Natural Bridge,
Balcony Falls,	Glenwood,	Oakdale,
Brownsburgh,	Goshen Bridge,	Rapp's Mills,
Buena Vista Furnace,	Jordan's Springs,	Rockbridge Baths,
Canicello,	Kerr's Creek,	Saunders' Store,
Cedar Grove Mills,	*Lexington*, (c. h.,)	Summers,
Collierstown,	Longwood,	Thompson's Landing,
Fairfield,		Timber Ridge.

Rockingham County.

Bowman's Mills,	Dovesville,	Melrose,
Bridgewater,	Edom,	Meyerhoeffer's Store,
Broadway Depot,	Green Mount,	Mount Clinton,
Cherry Grove,	*Harrisonburgh*, (c.h)	Mount Crawford,
Conrad's Store,	Keezletown,	Port Republic,
Coote's Store,	Lacey Spring,	Tenth Legion,
Cross Keys,	McGaheysville,	Timberville,
Dayton,		Waverlie.

Russell County.

Belfast Mills,	Hansonville,	Point Truth,
Bickley's Mills,	Hendrick's Mills,	Pound.
Dickensonville,	*Lebanon*, (c. h.,)	Rock Farm,
Gibsonville,	New Garden,	Rosedale,
Guest's Station,	Pine Spring,	Willow Spring.

Scott County.

Duncan's Mills,	Holston Springs,	Rocky Point,
Estilville, (c. h.,)	Nickelsville,	Rye Cove,
Fort Blackimore,	Osborn's Ford,	Stock Creek,
Holston Bridge,	Pattonsville,	Wayland.
	Quillinsville,	

Shenandoah County.

Columbia Furnace,	Liberty Furnace,	Orkney Springs,
Edinburg,	Lorenzoville Foundry,	Paddy Mills,
Forestville,	Moore's Store,	Saumsville,
Fort Furnace,	Mount Clifton,	Seven Fountains,
Hamburgh,	Mount Jackson,	Strausburgh,
Jacob's Church,	Mount Olive,	Tom's Brook,
Lantz Mills,	New Market,	Van Buren Furnace,
Lebanon Church,		*Woodstock*, (c. h.)

Smyth County.

Blue Spring,	*Marion*, (c. h.,)	Seven Mile Ford,
Broadford,	Olympia,	Sinclair's Bottom,
Chatham Hill,	Rye Valley,	Two Mile Branch.

Southampton County.

Assamoosick,	Drewrysville,	Ivor,
Berlin,	Faisonsville,	Jerusalem,
Blunt's Depot,	Farmer's Grove,	Newsom's Depot,
Bower's	Green Level,	Nottaway Chapel,
Boykin's Depot,	Green Plain,	Pond's Shop,
Branchville,		Vicksville.

Spottsylvania County.

Andrews',	Lewis' Store,	Spottsylvania C. H.,
Chancellorsville,	Matipony,	Thornburgh,
Clover Green,	Mount Pleasant,	Todd's,
Danielsville.	Partlow's,	Twyman's Store,
Fredericksburgh,		Wilderness.

Stafford County.

Accokeek,	Falmouth,	Stafford C. H.,
Belfair Mills,	Garrisonville,	Tackett's Mill.
	Hartwood,	

Surry County.

Bacon's Castle,	Cabin Point,	Spring Grove,
Baileysburgh,		Surry C. H.

Sussex County.

Blackwater,	Littleton,	Stony Creek Wareh's,
Coman's Well,	Newville,	Sussex C. H.,
Henry,	Parham's Store,	Wakefield Station,
Jarratts,		Waverly Station.

Taylor County.

Fetterman,	Harmony Grove,	Simpson's Creek,
Flemington,	Pleasant Creek,	Three Forks,
Grafton,	*Pruntytown*, (c. h.,)	Webster.

Tazewell County.

Abb's Valley,	Cove Creek,	Rocky Gap,
Baptist Valley,	Fine Oaks,	Springville,
Big Rock,	Hicksville,	Tazewell C. H.,
Blue Stone,	Ironville,	Thompson's Valley,
Burke's Garden,	Knob,	Tug River,
Cedar Bluff,	Maiden Spring,	Tumbling Creek,
Clear Fork,	Richland,	Valley.

Tucker County.

Black Fork,	Holly Meadows,	Pleasant Run,
Bonifield's Mills,	Lead Mine,	Saint George,
Hannahsville,		Texas.

Tyler County.

Kidwell,	Moore's,	Shirley,
Lone Tree,	North Bend Mills,	Sisterville,
Middlebourne, (c.h.)	Ripley's,	Wick.
	Russell's Mills,	

Upshur County.

Buckhannon, (c. h.,)	Lorentz' Store,	Overhill,
French Creek,	Marple's Ltore,	Rude's Mill,
Frenchton,		Sago.

Warren County.

Bentonville,	*Front Royal*, (c. h.,)	Milldale,
Buckton,	Hambaugh's,	Nineveh,
Chester's Gap,	Happy Creek Station,	Overall's,
Confluence,	Linden,	Water Lick.

Warwick County.

Warwick C. H.

Washington County.

Abingdon, (c. h.,)	Holston,	Mendotah,
Buffalo Pond,	Kinderhook,	Mock's Mills,
Clear Branch,	Laurel,	North Fork,
Craig's Mills,	Liberty Hall,	Raven's Nest,
Emory,	Lodi,	Saltville,
Forks,	Love's Mills,	Smith's Creek,
Glade Spring Depot,	Magnolia,	Sneadsville,
Goodson,		Three Springs.

Wayne County.

Adkinsville,	Falls of 12 Pole,	Savage Grant,
Amacetta,	Forks of 12 Pole,	Twelve Pole,
Ceredo,	Fort Gay,	Wayne C. H.,
Falls of Tug,	Palmetto,	White Creek.
	Round Bottom,	

Westmoreland County.

Hague,	*Montross*, (c. h.,)	Oldham's Cross Roads
Kinsale,	Nominy Grove,	Rice's Store.
	Oak Grove,	

Wetzel County.

Board Tree Tunnell,	Milo,	Pine Grove,
Burton,	*New Martinsville*,	Porter's Falls,
Davenport,	(c. h.,)	Proctor,
Knob Fork,		Van Camp.

Wirt County.

Burning Spring,	Newark,	Wirt C. H.,
Freeport,	Reedy Ripple,	Zackville.
Lee's Mills,	Spring Creek,	

Wise County.

Berge's Gap,	Big Stone Gap,	Wise C. H.

Wood County.

Belleville,	Fountain Spring.	*Parkersburgh*, (c.h.,)
Briscoe Run,	Lee Creek,	Pond Creek,
Bull Creek,	Limestone Hill,	Stillwell,
Davisville,	Lubeck,	Walker,
Deer Walk,	New England,	Williamstown.

Wyoming County.

Craney,	Morgan Valley,	Sun Hill.
Jo's Branch,	Oceana,	

Wythe County.

Austinville,	Graham's Forge,	Rural Retreat,
Brown Hill,	Jackson's Ferry,	Sharon,
Cedar Springs,	Mack's Meadows,	Speedwell,
Crab Orchard,	Reed Island,	*Wytheville*, (c. h.)

York County.

Bigler's Mills,	Half Way House,	*Yorktown*, (c. h.)

PRODUCTION OF COAL IN 1858.—It is estimated that the total production of coal in the whole world during the year 1858, was as follows:

	Tons.	Quality.
Great Britain	66,048,787	bituminous.
United States	14,920,996	"
Do.	6,867,944	anthracite.
Prussia	10,417,296	bituminous.
Do.	2,425,627	lignite.
Belgium	8,925,714	bituminous.
France	8,400,000	"
Austria	1,180,245	"
Do.	920,602	lignite.
Saxony	1,400,400	bituminous.
Do.	210,000	lignite.
Hanover	450,000	bituminous.
Hesse	150,000	"
Do.	100,000	lignite.
Bavaria	270,000	bituminous.
Spain	215,000	"
Baden	2,500	"
Other countries	7,000,000	"

From these figures it will be seen that Great Britain furnishes more than half of the coal of the whole world.

UTILIZATION OF THE TIDES.—The London *Chemical News* thus refers to the mechanical force which might be exerted by utilizing the tides:—"Let us suppose that by the action of the tides, the difference of level of the surface of the ocean at a certain spot, is 21 feet between high and low water. Omitting for the present all consideration of the power of the subjacent liquid, what is the mechanical value of a space of 100 yards square of this water? 100 yards square by 21 feet deep, equals 70,000 cubic yards of water, which is lifted to a height of 21 feet, or to 1,470,000 cubic yards lifted to a height of 1 foot. Now, since one cubic yard of water weighs about 1,683 lbs., 1,470,000 cubic yards weigh 2,474,010,000 lbs., which is lifted in six hours. This is equivalent to lifting a weight of 412,335,000 foot lbs., in one hour; and since one-horse power is considered equivalent to raising 1,800,000 foot lbs. per hour, we have locked up in every 100 yards square of sea surface, a power equal to a 230 horse-power steam-engine; acting, be it remembered, day and night, to the end of time; requiring no supervision, and costing nothing after the first outlay, but the wear and tear of the machinery. By means of appropriate machinery connected with this tidal movement, any kind of work could be readily performed. Water could be hoisted or air compressed, to any desired extent, so as to accumulate power for future use, or for transport to distant stations. Light of surpassing splendor could be generated by means of electro-magnetic machines; and with a very little exercise of ingenuity, every light-house on the coast could be illuminated with sun-like brilliancy, and with absolutely no expenditure of fuel."

PAPERS ON HYDRAULIC ENGINEERING.

By Samuel McElroy, C. E.

No. 2.—Destribution.

[From the Journal of the Franklin Institute.]

(*Continued from page 72.*)

As a consequence of the use of water supply under pressure, lines of distribution service to the several points of consumption are provided, and are common in principle of use to both the intermittent and constant systems of service, which have been previously noticed.

From the reservoirs of storage, or points of supply by stand-pipes and otherwise, these lines, branching off in various directions, with various proportions of calibre, and differences in material, have been applied to the solution of the problem of adequate delivery, adequate strength, and protection from the several contingencies of use; and have, therefore, involved not only the question of serious expenditure, but various interesting questions of propriety in manner of construction, arrangement, and method of use.

A system of distribution comprises lines of feeding mains, service mains, special service pipes, and the various appurtenances connected with the details of delivery, and is controlled in character by the extent of service as to relative supply and demand, the conditions of service as to pressure, and by range of admissible expenditure.

Distribution is generally the most costly feature of any water supply. Its proportion, for instance, at Brooklyn, in an original contract total of $4,200,000, was not less than $1,750,000; and while this matter of cost is determined by the extent of the system, the latter, in turn, chiefly determines the item of annual income, thereby regulating in an important way the propriety of this extent.

The materials which have been used at various periods and in various localities, and which may be noticed under a general head, are stone and brick conduits, earthenware pipes and pipes of glass, bituminized paper, lead, wrought-iron, cast-iron, zinc, tin, and other metals, wood, and other materials, some of which will be discussed under special heads.

Arrangement.—The most perfect system in this respect is that which transmits the supply to its consumers with the least loss in pressure from fractional and other obstructions to its flow.

To this end, a subdivision in supply districts is requisite for any system, properly controlled by lines of feeding mains, of adequate calibre for free delivery and circulation; and for want of proper attention to this principle, the value of many supplies has been seriously injured, under circumstances which render remedies difficult in application.

In a number of cases, we find small and independent feeding mains, attached to service mains as low in calibre as two, three, and four inches. Not only does it result from this, that the pressure on the house service is seriously vitiated, from a natural law in hydrodynamics, but in the important special use of a fire supply, instances abound where serious losses have resulted from a restricted discharge at the hydrants on this account. And as experience proves that a line of 4-inch pipe will not properly supply more than one fire engine, except under an unusual pressure, it may be taken for granted, wherever fire supply is an object, that all lines of this calibre should be short, and connected with larger mains, and that 6-inch mains should be assumed as the minimum for lines of general service. This principle was adopted as a rule in the arrangement of the Brooklyn distribution, the use of 4-inch pipe being restricted to hydrant branches. It is also adopted by the Croton Board for extensions of service.

Due attention to this arrangement of districts improves the operation and efficiency of the supply, admits greater extensions with less loss in head, and a much more simple and effective location of stopcocks, which control delivery, accidents, and repairs, and which need, for this reason, particular care. The larger and more complete this framework of feeding mains, around the special districts of service mains, the better, within limits of reasonable cost, and subject to local contingences of supply, pressure, demand, and extension; and for these, as thus determined, the calibres may range from eight, ten, and twelve inches, to sixteen, twenty, twenty-four, and thirty. Some of the Croton mains of this class are thirty-six inches in diameter. As an illustration of forethought on this subject, and a good example, the following extract is made from the Philadelphia Water-Works Report of April 19, 1855:

"The distribution of the old city proper, although arranged in 1819, before any other in this country, is very perfect, the system originally laid down having been strictly adhered to."

"The city is crossed upon the highest streets, running north and south, by two supply mains of twenty inches diameter each; and in the opposite direction, through the centre streets, runs a main of thirty inches diameter; the whole plot is circumscribed by mains of sixteen inches diameter, reducing to twelve and ten inches, and it is crossed north and south at intervals of about 1,200 feet by mains of ten and twelve inches; these again are crossed east and west by several mains of sixteen, twelve, and ten inches diameter (all connected at proper intervals, and making a complete net-work of mains and feeders), supply the remainder of the distribution, which consists of six, four, and three-inch pipes. The arrangement is quite complete, the only source of regret being that any pipes so small as three inches should have been used; but at the very early date when the distribution was devised and commenced, they were considered more than sufficient. Many new water-works, however, executed within a very short period, and long after those of the old city, have, notwithstanding the advice and experience of Fairmount Works, fallen into the same error, and are now suffering from the want of larger pipes and mains."

Usual Practice in Materials.—Notwithstanding the varieties of material which may be and have been applied to water distribution, the general modern practice has adopted the use of cast-iron mains for service. For house service pipes, lead is generally used. These materials have several advantages and defects, which require special notice.

Cast-Iron Pipes.—The strength and durability of this material; its facility for ready adaptation to the different forms of mains and their special appurtenances; facility in making joints, and in tapping for house service; in connection with the influence of long established custom—comprise its chief advantages.

The ordinary form of joint in use, the "spigot and faucet," is that made with a hub at one end of the pipe, expanded to take another pipe, with a joint for gasket and lead packing, varying in width from three-eighths of an inch upwards, and averaging about six inches in length. These admit considerable expansion and contraction, and are therefore perferred to flanch joints, or the conical joints originally introduced in London, and abandoned on account of frequent breakage from this cause.

Special cases, however, frequently occur, where flanch joints may be used with economy, and fully guarded against objectionable rigidity.

It is found, however, that expansion affects the lead joints sensibly, causing it to "crawl" in its socket, particularly after the gasket is destroyed, to remedy which, in part, the hubs are cast with a countersunk bead, which tends to hold the lead in place.

In pipe lengths and sizes, improvements have been gradually made in foundry work, increasing the lengths from the old thirty-inch sections of the Albany and other works, up to ordinary lengths of nine feet, and more recent lengths of twelve and fifteen feet, with much advantage in handling and economy in laying, since the expense at the joints is a serious item of cost, the lead alone, independent of labor, ranging in value from about 58 cents per joint for 6-inch pipe to $5.18 for 36-inch. Practically, at the foundries, there is but a slight difference in cost per ton between the shorter and longer lengths, except for very large diameters.

The usual test is that of 300 lbs. per square inch under hydraulic pressure, in connection with a hammer test, which may be made needlessly severe, with a pipe under great tension. This is equivalent to a hydrostatic head of 690 feet, or about four times the usual pressure in water-works practice—245 feet, as at Albany, when the upper district is connected with the lower, and 230 feet as at Watertown, and a few similar cases, being exceptional instances in the United States, although exceeded in some European supplies. This test, however, has this fallacy, that it is applied only to the pipe castings, while the joints, as the true source of leakage, are laid without any trial, except that of actual use. There is an extreme and hurtful zeal in one case, with such a peculiar metal as cast iron, which may be permanently injured before it shows any symptoms of yielding, and an oversight in the other extreme, as to the ordinary points of damage. Unquestionably, a considerable part of the loss of supply now attributed to house waste, is due to defective joints in the service.

Objections.—The objections to the use of cast-iron may be summed up in its cost, its defects in casting, its loss of length, and other defects at the joints, the difficulty in breaking joints, and its liability to destruction and discoloration of supply by oxides, and by tuberculation, which also restricts its delivery.

Cost.—The excessive weight of metal used for the qualities in ordinary application, involves items of expense for transporting and handling material, freight, distributing on line of work, and labor in laying, as well as for value of material. To this is added the cost of jointing. The weights for pipes, of 12 feet length, may vary from 225 lbs. for 4 inches diameter to 4,600 for 36 inches diameter, and the following table will show the variation in standard, from two recent water-works schedules:

Cast-Iron Pipes.—Standard Weight.

LENGTH AND CLASS.	4 in.	6 in.	8 in.	10 in.	12 in.	16 in.	20 in.	24 in.	30 in.	36 in.
9 feet A, .		330	430		680		1600		3000	3600
9 " B, .		360	500		820		1900		3700	
9¼ " A, .		347	453		716		1682		3160	
9¼ " B, .		378	525		864		2060		3900	
12 " A, .					920		2100		3660	4750
12 " B, .					1080		2500		4890	
12 " (to lay)	225	368	480	750		1432		2511	3845	4607

In this case the A class is arranged for a practical head of about 100 feet, and the B class of about 150 feet, the lengths including the hubs; the weights given in the last line refer to a head of about 120 feet, and the length is exclusive of hubs.

Including the value of the material, the cost of such pipes per lineal foot laid, may vary from about 55 cents for 4-inch to about $9.50 for 36-inch, and readily aggregates a formidable sum.

This item can only be modified in amount by any substitutes, and must always keep the distribution service in the front rank of expense. We may have occasion to allude to these modifications under another head.

Casting.—In foundry work, this metal is liable to defects from various causes. Unequal shrinkage, uneven thickness, blisters, sand holes, air cells, cold shuts, &c., may result from the spring of core bars, yielding at the ends, displacement of core coating, unequal rate of cooling, steam and air bubbles, the effects of local ebullition, and of floating sand, slag, dirt, &c., on the hot metal. For these and other obvious reasons in grade of metal, pipe castings should be made vertically, hub down, in loam moulds, and of a pure quality of iron. But their quality is generally inferior, although vertical castings are coming more fully into use.

Soft and impure iron is less strong and much more subject to oxidation and tuberculation, than better grades, although the relative cost of material operates strongly in favor of its use for water-works by contractors, while the same consideration favors green sand castings in inclined and horizontal moulds.

Joints.—By the common method of jointing described, it follows that an increase in weight is required for the hubs, both on account of their enlargement, and for additional strength to resist the process of caulking; and whatever length of pipe is appropriated to the joint is a direct loss, varying from five to seven inches on each pipe. Economy in movement and in jointing, therefore, urges the adoption of the longest practicable lengths. It is also evident, that reduction in number of joints must reduce the contingencies of leakage, so far as affected by the operation of expansion, contraction or other general causes.

When it becomes necessary to take up a line of pipe, or a defective pipe, the lead must be melted by a hot fire from several hubs, to spring out one piece. This process is objectionable for several reasons, but is inevitable with this manner of jointing.

Practically, all the tightness of a lead joint is included in the depth of an inch or so, which is expanded by the action of the caulking tool, the gasket serving no other purpose than a mould for the running lead, and frequently defective in this office. There is room then for question, whether the sleeves which are frequently used for jointing large pipes may not be commonly ap-

plied with advantage, since they may be easily and cheaply cast, save the losses in length at the hubs, are jointed with double caulked faces, and may be cut away and replaced without the trouble, expense, and risk of a hot fire on the mains for several lengths. It may also be said that flanch joints save the losses in length, and as "face" or as "rust" joints may be made tight and durable. They are also cheaper, altogether, than hub joints, and are frequently used on large mains for special connections. With occasional "slip joints," or with occasional pipes or flanches cast to admit expansion, their chief objection may be obviated.

The most perfect hub joint is that which is made with a full lead packing, caulked both on the outside and inside. This secures a smooth water-way, avoiding the use of gaskets, but can only be applied with convenience and certainty to pipes of large calibre. The 36-inch force mains of the Brooklyn pumping engines have 7-inch hubs, jointed in this way. In jointing, as in all other mechanical operations, good workmanship is essential to any method which may be adopted.

Oxidation.—The natural action of water on cast iron pipes produces oxidation. It has been held that this effect is mainly controlled by the constituents of the water in contact with the iron, different qualities having different effects; but it is much more certain that the constituents of the iron determine the rapidity and extent of oxidation in connection with those of the water, and as the most prominent cause. A walk through any pipe-yard after a rain, very clearly shows how much more susceptible to this action some castings may be than others, probably from the same foundry; and it is evident, without argument in detail, that the differences in combination of material, and in method of casting, must essentially affect the liability to this action, and particularly with a class of castings which are impure, and rudely manufactured, at comparatively low prices.

From the thickness of pipe which the quality of metal, rather than the limit of resistance, renders obligatory in the foundry, the ordinary process of oxidation involves no immediate danger to the castings, under pressure. Its chief objection is found in the impregnation and discoloration of the contents of the mains. Where the house-taps are placed on the top of the mains, drawing their supply from the purest currents, and the supply is not subject to extraordinary agitation, oxidation may progress to a large extent, without making itself apparent in the house service; but if the hydrants are thrown open for fire purposes, or other causes of general agitation occur, disturbing the heavier particles in the mains, the evidences of their presence become at once and prominently sensible, and in some cases render the supply unfit for domestic use for a length of time. With unprotected mains, this is an evil which can be remedied only in degree, as to its palpable effects, while the process of destruction is as certain as it is slow. Unquestionably, different kinds of water will differ in degree of effect in oxidation, and different proportions of air in the same water have also their degrees of effect; but the prominent causes is attributable to the castings themselves, as being more or less impure, and therefore more or less subject to oxidation.

(*To be continued.*)

BURSTING OF A RESERVOIR.—The new reservoir recently completed by the Brompton and Gillingham Water Works Company, for the supply of the towns of Chatham and Rochester, England, with water, has burst. The water issued out near the north angle, and forced its way over the land into the turnpike, leading from Canterbury to London, several feet in depth. The capacity of the reservoir was one million gallons, and at the time of its bursting it was nearly full. The damage is estimated at about $25,000.

NEW LIGHTHOUSE AT GIBRALTER.—A new lighthouse on Cape Spartel is now in progress of erection, the French Government having urged the necessity of the work. The first stone of the spiral stair was laid with some ceremony on August 5th, in the presence of the Emperor of Morocco's commissioner, Si Mahommed Bargache, the officers of the French Mission, and the French Engineer charged with the works.

CHEMISTRY OF COAL GAS.

A LECTURE BY DR. LYON PLAYFAIR.

Distillation of Coal.—Showing how the former Waste Products in the Manufacture of Gas have been Economized. Salts of Ammonia, Benzol, Tar Colors, &c.

(*Continued from page* 93.)

But I must go faster with my subject. I now pass to coal-tar.

Now, coal-tar is a very complex body. It contains a large number of substances, same of which are volatile, others more difficulty volatile, and others not at all volatile in the ordinary sense of the word.

I have here a retort filled with tar, and I am now going to pass through that a current of steam; and you will see that after a little when it passes through freely it will distil over along with the water, and that this water will contain, swimming on its top, a certain quantity of naphtha. The steam which passes through the tar will take away the more volatile portions of the tar and condense it upon the top under the name of naphtha. What remains behind is a mixture of what is called dead oil and pitch. This dead oil is afterwards distilled off, and what remains behind in the retort is finally pitch.

In distilling it in this way we obtain from 100 parts of coal-tar, of naphtha 9 parts, of dead oil 60 parts, and of pitch 31 parts, so that there are various substances obtained. I have only time, however, to deal with the naphtha. Now, naphtha itself, or the substance which we get over by distilling the tar with steam, is a general word also. I have placed on this diagram the products of the tar. Crude naphtha contains all these substances which are written down there; but I will refer you at present to the upper division. The crude naphtha contains. first, basic oils, or oils acting as bases; secondly, acids oils, or oils acting as acids; and thirdly, neutral hydro-carbons. You will notice in the diagram, as in all the diagrams which we shall use, that whenever we have a body acting as a base, we color it blue to show that it is a base, like this soda which colored red water blue; when it is an acid, we color it red; and when it is neutral we color it green; so that when you find a body written red, it is an acid body; and when it is green it is a neutral hydrocarbon.

This naphtha is now taken and purified and clarified: There is added to it sulphuric acid. The sulphuric acid takes up the basic oils which are at the top, and unites with them and forms salts—sulphate of these bases. (We will complete our distillation of the tar afterwards. It is making too much noise for me to have my lecture accompanied by it. We will finish it after the lecture, and you shall see the products in the next lecture.) The sulphuric acid unites with the basic oils and produces this "sludge," as it is termed by manufacturers—the bases united with the acid.

Now, these are extremely valuable, and it is from them that these coal-tar colors, which I am going to speak of presently, are obtained; but they are entirely lost by the manufacturer. They will probably be saved afterwards, but at present they are thrown away as a sort of tar. The first things that we obtain of any advantage are the acid oil and the naphtha. The naphtha itself—the crude naphtha of which there is a specimen—there is employed at once, without any purification, for the purpose of making india-rubber waterproof coats and similar articles. But it is purified for various very important purposes. When the most volatile portions are collected, what comes over are the acid oils. Now, these acid oils consist of two acids—carbolic acid and cressylic acid. Carbolic acid has the formula $C_{12}H_6O_2$; and the cressylic acid is what is called a homologue of the other, or contains C_2H_2 more. It consists of $C_{14}H_8O_2$. Common creosote is a mixture of these two acids. This carbolic acid which forms common creosote, is, after purification, and when perfectly dry, a solid; and it is this beautiful acid which I have present here. I see the manufacturer of this very specimen in the room, and I wish he was lecturing here to tell you more about it than I can. Before he sent me this beautiful specimen, I had never seen it in commerce solid; it is generally liquid. This carbolic acid when united with lime forms one of the most powerful disinfectants we have, which I will show you in my last lecture, when we come to the subject of sanitary chemistry. When this acid is treated with nitric acid it loses part of its hydrogen, and that hydrogen becomes replaced by peroxide of nitrogen, a lower oxide of nitrogen than nitric acid. When it is treated with nitrogen three of these go away, and the hydrogen is replaced by what is termed a compound radicle—a body which plays the part of hydrogen, and which forms this yellow substance called carbazotic acid. Carbazotic acid is carbolic acid, three of whose equivalents of hydrogen have been substituted by three equivalents of an oxide of nitrogen.

Now, this carbazotic acid can be prepared in large quantity from creosote by the action of nitric acid, and can be employed at once for dyeing. If I take a skein of silk and agitate it for a little in this carbazotic acid, it will take on the dye without any previous preparation, and it is dyed a beautiful yellow color. You see how it has already taken on the color, and in this way you can dye silks of a beautiful color with this substance obtained from the former waste product of coal-tar. This material has also been lately employed, as almost everything is employed, for various other useful purposes. It is an excellent antiperiodic, like quinine only, when employed, it dyes the skin of the patients yellow, and they, therefore, have a sort of artificial jaundice. But it has also been suggestedfor another purpose. It may be mixed with arsenic and other poisons for the purpose of rendering them more ready of detection. It imparts to the arsenic a bitter taste, and it also turns the person to whom it is administered yellow, and in a case of slow poisoning this yellow appearance would be an indication that there was something wrong.

Cressylic acid, another of the compounds of crude coal-oil, is not much employed in its separate state.

I now pass to the neutral hydrocarbons. The neutral hydrocarbons are also various. They are called benzol, toluol, xylol, cumol, cymol, and a great many other names with which I will not trouble you. They are compounds of hydrogen and carbon, and possess many degrees of volatility. For instance, benzol boils at 177°. This is one of the most useful of the substances. It is made from crude naphtha by a simple operation, taking advantage of its low temperature of ebullition. Here is a benzol still. The crude naphtha is placed in this still. It is a double still, into which steam is sent from this steam-boiler in order to heat the crude naphtha. The top of the still, you will obserye, passes through a cistern of water. That cistern of water is kept at the boiling point of benzol, 177°, and the vapor of the naphtha passes through the heated vessel, which is heated to 177°. Benzol distils over at 177°; but toluol, cumol, cymol, and the others boil at a much higher tempreature. Therefore they are condensed at that temperature, and fall back into the still. The separation is, therefore, effected simply by means of keeping the benzol at its own boiling temperature, and cooling the others below theirs. It is a very volatile substance. It, no doubt, adds much to the illumination of our coal gas. We will show you this. I have here the means of showing you the gas, first, not passed through benzol, and then passed through benzol. I first take the gas not passed through benzol, and if I light it you see that there is little illumination. You can scarcely see it at all at a distance. Now, I will pass some gas through this benzol. It is now passing through, and you see how the gas has licked up this volatile body, and given us a stronger illumination. Benzol is, no doubt, one of the illuminating vapors which exist in common coal gas.

Now, this body, when acted upon by nitric acid, produces what you will find in that big bottle—nitro-benzol. I must call your attention to nitro-benzol a little scientifically. Benzol has the formula $C_{12}H_6$,—that is, it contains twelve equivalents of carbon and six of hydrogen. In nitro-benzol one of these equivalents of hydrogen goes out, and one equivalent of oxide of nitrogen, NO_4, goes in and substitutes it, and then forms nitro-benzol, a substance which by itself possesses some peculiar characters. It smells strongly of bitter almonds, and it is employed now instead of bitter almonds, which is poisonous, for making common almond soap. That common almond soap which we buy is now perfumed with this nitro-benzol. It is also employed in confectionery as a substitute for bitter almonds. It is much better for that purpose, because the bitter al-

monds contain prussic acid, and by the use of too large a quantity by our cooks, we may poison our friends. There is no chance of that taking place when nitro-benzol is used. It is the basis from which we derive our tar colors, and the mode in which it is used for this purpose will require a little close attention to a chemical formula; but it is very interesting.

If nitro-benzol is acted upon by water and by iron, of which I have put down the symbols here—nitro-benzol + water + iron = $C_{12}H_5(NO_4)+2\ HO+4\ Fe$—the iron takes away all the oxygen from the water, and the ogygen from the oxide of nitrogen. There are six equivalents of oxygen, which the iron takes to itself and forms iron rust with it. This rust remains, and the two of hydrogen of the water now joins itself to the $C_{12}H_5N$, and produces this body here, $C_{12}H_7N$, aniline. That is to say, the iron takes away the oxygen and leaves oxide of iron and aniline as the result.

Now, this aniline is a most important body. It was first investigated by Dr. Hofmann, who has made with regard to it, a series of the most brilliant researches out of which have arisen these coal-tar colors with which we are now acquainted. Aniline is an ammonia. It is a body exactly resembling the base ammonia, but it is what is termed a compound ammonia. Here is the constitution of ammonia:

$$N\left\{\begin{matrix}H\\H\\H\end{matrix}\right.$$

I put down the three atoms of hydrogen separately. Now, if I take away one of these atoms of hydrogen, and substitute it by one of something else which plays the part of hydrogen, I form a compound ammonia. I will do so in this case.

$$N\left\{\begin{matrix}C_{12}H_5\\H\\H\end{matrix}\right.$$

I have replaced one atom of hydrogen with a compound radicle which chemists call phenyle, and I obtain what is termed aniline. This aniline is therefore a compound ammonia in which the radicle phenyle replaces one of hydrogen.

When Hofmann began his researches upon this subject, aniline was made by a laborious process by distilling indigo with potash; and the possession of a pound of aniline in any chemical laboratory would have been looked upon as a wonder. Now you see that out of coal-tar we can present to you upon the lecture-table whole gallons of aniline, and it is now sold for a few shillings a pound. I have here a series of the substances formed in the production of Magenta. I am indebted for them to the discoverer of Rosaniline. Here is a block of coal weighing 100 lbs. This block of coal produces this amount of tar when distilled. Here is the amount of aniline which, with the most economical manufacture, can be extracted from that block of coal; but still, although it appears to you only a small quantity, it is in fact, a most economical quantity compared with the processes which were formerly employed. It is out of this aniline that the peculiar dyes are obtained, and this is the quantity of the Magenta dye which can be obtained from that large quantity of coal. If you will examine these products after the lecture, you will find this a very instructive proportional series.

Now, it is out of this aniline that we produce mauve, Magenta, roseine, azuline, bleu de Paris, and the various colors which have received arbitrary names. It was known for a long time that the products of distillation of coal had a strong tinctorial power. Here, for instance, I have one of them—a body called pyrrole. I have here a piece of pine-wood, which I see Mr. McIvor has made for a theatrical purpose, in the shape of a dagger. I will now moisten this with muriatic acid, and then place in a deep vessel which contains a few drops of pyrrole. You see that it suddenly gets as it were covered with blood. This muriatic acid is mixing with it, and the dagger comes out in a sanguineous state. You observe the strong tinctorial power which this substance has by the deep color which it produces. Now, this tinctorial power has been known, in fact, for a long time, but the mode of manufacturing the substance readily and economically was not known. Here I have a small quantity of aniline, and I agitate it with water; and now, if I add to that a solution of bleaching powder, you will see the effect it produces. It was long known that this aniline gave a purple color with bleaching powder. The color comes after a little while; it does not come immediately, but you see, as I add it, that the aniline droduces a mauve or a purple color; and this was known for many years, before persons knew how to make it for commercial purposes. This is now a color used in the arts. The first person who introduced this, and to whom the greatest credit is due for its production, was Mr. Perkin, a pupil of Dr. Hofmann. Mr. Perkin had seen and admired the tinctorial power of aniline, and he had an ambition to render this fugitive color permanent, and to introduce it into the arts as a dye, and he succeeded admirably. The mode is this: this aniline is a base, and unites with sulphuric acid as ammonia does, and it forms sulphate of aniline. He takes equivalent quantities of aniline and bichromate of potash, and mixes them together, and in a little while, after standing together, they form this very unpromising-looking black powder. You see this black powder here; it looks extremely unlike a dye. Now, when this color is washed with coal naphtha, this nasty-looking brown resinous substance is dissolved out of it by the coal naphtha, and then there remains a still unpromising substance, but which is rather purple in color. When you treat with alcohol this brown powder, which has been washed with naphtha and had the resin taken out of it, it forms with the spirit a strong solution of mauve. This beautiful purple color is obtained in this way—by dissolving out of the brown powder the purple color by means of alcohol; and it is this purple color which is used largely in dyeing. It is readily soluble in alcohol. If I take a washing-bottle of alcohol, and throw a little of it upon the substance, you see that the beautiful purple color of this substance is readily manifested. (The substance had been previously spread on a white paper screen, and there remained unapparent; but upon the projection of the stream of alcohol upon the screen, the purple color was produced where the alcohol came in contact.) It is a substance which you can easily detect and find out whether you are dealing with this color or dealing with some colors derived from lichens, which have a similar character. I have here aniline purple, and I now add to it a little sulphuric acid, and I will show you that it is very easy to detect which color you are dealing with. The sulphuric acid turns it first to a dirty green. If now I add to this a little water, this dirty green becomes a beautiful blue. The light has become bad. The day is not a good one for showing you these colors. I am afraid this day-light, or want of day-light, will render it necessary for you to take what I say on trust. The addition of water makes it a beautiful blue. This is a second test for it; but if now I add a little more water to it, it is restored again to its purple state. You see on pouring it into this large jar that it resumes its beautiful purple, and in this way you can easily detect its presence. The sulphuric acid turns it a green, a little water turns it a deep blue, and a large quantity of water brings it back to its original purple condition.

It is easy to dye with this aniline purple; in fact, ladies can dye with it perfectly themselves. It is only necessary to use for this purpose hot water—water so hot that you cannot bear it with your hand, but not boiling. The best temperature is about 150°. If you take this hot water and add to it a little tartaric acid and a little of this aniline purple, and then place the silk or woolen in it, it becomes dyed. It is easy to attach the color to animal fibre, but not to cotton. In the next lecture I have to explain to you its application with regard to cotton. I have here the coloring matter, and now I will add to it a solution of tartaric acid, which is necessary to produce the color. After that all I require is to place my silk in this solution, and to rinse it for a little time in it, and you see that it quickly takes up the color and produces that beautiful mauve which is now so familiarly known It is therefore, a substance which is extremely easily applied—almost as easily as the carbazotic acid.

Although I am within a minute of the hour, I must ask your attention for five minutes more. The next dye to which I have to direct your attention is Magenta, or, as it is more properly called by Dr. Hofmann when it is in a state of purity, rosaniline. I should like also to prepare this before you, and show you the method. Any weak oxidizing agent less strong than bichromate of potash, produces this substance. I will take here bichloride of tin for my purpose. I add to this anhydrous bichloride of tin an excess of aniline. It must be done cautiously, for the action is energetic. As soon as the action subsides, we will add a little more, and finally heat it until I drive off all the aniline. I must have an excess of aniline and then drive it off, after which the Magenta will be seen to appear. This will take a little time to perform. Mr. McIvor will now heat this gently, passing it slowy over the flame at first, as the action is violent, and will continue the heat until our Magenta begins to appear. After a little time we shall have a very good imitation of Magenta, but not nearly so good as is produced by the manufacturers, who now produce it on the most magnificent scale; I allude to Messrs. Simpson, Maule, and Nicholson, to whom I am indebted for a number of the illustrations that are exhibited here, and for this crown, which is made of the substance in the ordinary condition in which it is sold—acetate of rosaniline. You see what a magnificant crown it is. The formula of rosaniline I have written here.

$$N_3C_{40}H_9$$

It is what is called a triamine, or it is three atoms of ammonia which have coaleseed into one; and this rosaniline forms, with acetic acid and other acids, deeply-colored salts, of which this ordinary Magenta is one. You will see a crown in the exhibition, which I think is one of the most remarkable of the scientific exhibits which we possess. The crown is composed of the acetate of rosaniline. You see the difference between this rosaniline and mauve. It is of a much redder color than mauve, and is more definite in its character. Mauve is a neutral body, not possessing either basic or acid properties; while, on the other hand, rosaniline is a true ammonia—a true base.

Now we have formed our Magenta by this experiment. I think I can show you the color better if I pour it into water and add an acid. You will then also see its tinctorial power. After a little time it will dissolve and form a solution of this substance. It is a powerful tinctorial body. There (referring to a bale on the lecture table) is the quantity of woolen which is dyed from the amount of Magenta produced from 100 lbs. of coal. There is the 100 lbs. of coal which produces this small quantity of Magenta and that bulk of wool is dyed from it, so that you see its tinctorial power is great.

As I have only given you an introduction to the subject, and you will afterwards have the application of this to calico printing, I will only say one word as to the blue color which is obtained, and in the next lecture, and the lecture afterwards, we shall have an abundant opportunity of following up this subject. Not only have reds and purples been obtained in this way, but a yellow has recently been procured by Mr. Nicholson, to whom we are so much indebted; so that yellow, red, and blue, the three primitive colors, are now to be obtained from the coul-tar. Here is one called *bleu de Paris*, or *bleu de Lyons*, or azuline. It is obtained sometimes from aniline by the action of oxidizing agents, such as bichloride of tin, at a high temperature under pressure—a temperature of 350°. But most of these blue colors are made from carbolic acid, and not from aniline. I think I can show you here the blue color. I have put some of this blue upon this paper. There is one which is obtained from carbolic acid or from creosote. The process, however, is not known; it is still kept a secret in the arts, but you see what a beautiful color it is; and what a power we have in possessing the three primitive colors, by the mixture of which we can obtain so many others.

As a new art, the manufacture of these colors is of great importance. Hitherto England has been dependent upon foreign countries for its dyes. We have imported madder from Holland, from Turkey, and from France, and blue colors from India, in order to produce our calico prints; but you see now that we are likely to reverse this. We find in this waste product, coal-tar, the three primitive colors out of the mixture of which we can produce almost any shade we desire; and without taking upon myself the character of a prophet, I think I may easily predict that, in a few years, England will be a color exporting instead of an importing country. In this country, even now, coal-tar, notwithstanding all these applications of it, is worth only from a penny to three halfpence a gallon. These discoveries will probably alter the whole character of

calaco printing, and make this country an export market of colors.

As this is a highly important industry, I have solicited your attention to two other lectures on it.

PETROLEUM ITEMS.

Experiments on the Inflammability of Petroleum.—As great quantities of American petroleum are now imported into Liverpool, a number of the merchants in that city made complaints to the Town Council that it was explosive, very dangerous, and should not be permitted to be stored in the dock warehouses. In order to obtain positive information respecting its explosive and inflammable character, the Liverpool Town Council lately made several interesting experiments. A temporary brick vault was erected upon an empty lot of ground and a small cask of Canadian ptroleum was first placed in it and ignited, and after burning for a short period it was extinguished by one of Phillip's Fire Annhilators. A second cask was then ignited and allowed to burn for five minutes, and extinguished in the same manner. A third cask contianing thirty-four gallons was ignited and the fire allowed to acquire considerable headway and intensity, when two streams of vater through hose were brought to bear upon it; after a short period the flames were extinguished. A barrel of petroleum was then placed upon the open ground and ignited, and when the fire had become intense, two streams of water were applied, but were found very ineffectual. A fire annihilator was then placed in the fire and it also failed to extinguish the flame. More copious streams of water, however, accomplished the object at last. A barrel of Pennsylvania petroleum, standing upon end, was then ignited on the open ground. Its flames rose higher than those of the Canadian petroleum and they were ultimately extinguished by powerful streams of water. Those who witnessed these experiments were surprised that none of the barrels exploded, for they had expected such a result. Petroleum is not explosive, but its vapor mixed with atmospheric air is. The very inflammable nature of the petroleum, however, led the Town Council of Liverpool to conclude that it should not be stored adjacent to warehouses, or on docks containing common merchandise.—*Scientific American.*

Necessity for a Government Petroleum Inspector.—The *Journal of the Board of Arts and Manufactures for Upper Canada*, has some sensible remarks on the subject of the necessity for a government inspector for petroleum we have before heard complaints of the adulteration of the crude oils, and buyers have often been perplexed in making their purchases. The *Journal* says:

Two thousand barrels of Canadian oil were lately ordered by a German house, and despacthed from Enniskillen to Montreal to be shipped to Bremen; when the oil was examined accidentally at Montreal, it was found to be *adulterated with water*. On inquiry at Enniskillen, it was ascertained that the party furnishing the oil had pumped it from Black Creek, and sent only surface oil mixed with water. Fortunately this was found out in time, or else this miserable specimen of Canadian oil would have been shipped to Germany, and a bad name given at the ottset to a most important and rising branch of Canadian trade. Many inquiries are now being made for Canadian petroleum, and there is every prospect of a large trade with continental Europe springing up. But if we wish to retain the trade, it is essentially necessary that the dealings of oil shippers should be honest and upright, or else the trade will rapidly acquire a bad name. In order to prevent such wretched frauds as we understand have recently been attempted, all exported oil should be subjected, we submit, to the inspection of an officer appointed by the government, and each barrel branded according to its character, its specific gravity being determined as well as freedom from admixture with water. The system adopted for branding fish barrels, &c., would be of vast advantage to the oil dealer as well as to the country.

The extraordinary importance of the petroleum trade may be inferred from the fact, that the exports of petroleum, crude and refined, from the United States for the first half year of 1862, amounted to 4,379,669 gallons, equal to 109,492 barrels, valued at $1,413,390.

It is now sent to every quarter of the globe. At Philadelphia the price has varied from 23 cents on January 4th, to 9 cents a gallon for crude oil on May 10th. It is now, August 10th, 12 to 14 cents a gallon for crude, and 25 to 32 for refined. The largest exportations have been sent to Liverpool, the quantity in the first half year of 1862, being 2,291,344 gallons; this is exclusive of Enniskillen oil. Liverpool takes nearly as much as all the rest of the world together; Enniskillen oil men should note this, and I keep a sharp lookout on any one who attempts by dishonest dealing to make a few dollars for himself at the risk of ruining a most valuable trade.

More Flowing Wells in Canada.—A number of flowing wells have been recently struck in the Enniskillen oil region in Canada. Among these, one was opened by Mr. J. W. Silton, who came upon the oil at a depth of 153 feet. The oil came rapidly to the surface, and the yield is estimated at from 1,000 to 1,500 barrels in 24 hours. Mr. Wm. Webster struck a vein of oil at the same depth, which flows at the rate of about 800 barrels in 24 hours. Messrs. Fairbanks and Eakins tapped another flowing well in the same district, at a depth of only 116 feet, which is said to be the shallowest flowing well in the region. The yield is computed at about 500 barrels per 24 hours.

A Fortunate Editor.—Mr. E. T. Soles, the editor of the Oil Springs *Chronicle*, recently struck a valuable flowing well.

Oil Association.—The owners of the oil well at Enniskillen have formed an association for the sale of their oil. The association takes charge of all the oil raised in the district, and when sold, distributes the proceeds amongst the owners in proportion to the yield of their wells.

Oil Trade of Pennsylvania.—The Oil City *Register* of Sept. 11th has the following weekly review of the market of that region:

The market this week has been moderately active. Oil is being held at the wells at 75 cts. and $1. These figures appear to be above the views of the buyers, consequent upon the unsettled state of our Eastern and other markets, brought about by the falling back of our troops to Washington. The oil market in Pittsburg is much depressed, and crude is dull sale at 5@6 cts. The Eastern markets are depressed in like manner from the same cause. We anticipate it will be a month or six weeks before the market again assumes the buoyancy that ruled it two weeks since. Another unfortunate circumstance is the fact that the provisions of the new tax-bill will work unfavorably for refiners. They are required by it to build fire-proof sheds to store their oil in, or else to pay their tax three times a month; this but a very few can afford to do, and consequently, a large number of them will have to suspend operations. It is hoped, however, that the Commissioner of Internal Revenue will modify this oppressive clause. The tax on refined oil seems to have been gotten up solely to benefit large refiners, to the utter crushing out of the small ones, and thus give to a few large establishments a monopoly of business. If this matter is not remedied, it will be a serious detriment to our oil business, and will ruin thousands throughout our land. Our new wells are holding their own very well in the matter of production.

European Shipments.—The following information we obtain from the Toronto *Globe:*

"We are informed that three thousand barrels of Enniskillen petroleum are now being shipped by way of Montreal to a wealthy Bremen house. The firm was largely engaged in distilling oil from the Bathgate coal, and had works in operation extending over a space of twenty acres. The expense of shipping the coal to Germany was, of course, considerable, and the discovery of petroleum threatened to throw the manufacturers of the paraffin oil out of the market. Determined not to be outdone, this firm at once ordered three thousand barrels of petroleum from Canada, as an experiment, and will, it is said, consume 100,000 barrels a year, when they have their works in full operation. To give an idea of the extent of the concern, we may mention that they will sacrifice $50,000 or $60,000 in changing the works from coal to petroleum

"Another fact we may mention. A large Russian house have made inquiries in England and Canada, to discover whether petroleum to the extent of a thousand tons a month can be procured in this country, their object being to manufacture oil gas in a Russian city. Whatever may be said of the respective advantages of gas from coal and from petroleum in places where coal is easily procured and cheap, there can be no question that in localities distant from coal beds the petroleum must have the preference."

Gas in England.—The condition of the Liverpool Gas-Light Company is highly flourishing. Their last report shows a surplus, after the payment of the year's dividend, of £6,970 19s. 7d. from which there will be taken £4,124 5s. 10d. to the reserve fund. The consumption of gas is largely on the increase, and on this account, and the flourishing condition of the company's affairs, the directors recommend that the price of gas be reduced 2d. per thousand, and in the out townships 3d. per thousand cubic feet. This reduction will make the price within the borough 3s. 7d., and without 4s. At a meeting of the stockholders the report of the directors was adopted, and a semi-annual dividend of five per cent. declared.

The Lewes Gas-Light Company is also in a prosperous condition. The profit to the dividend account was said to be £1,362 15s. 1d. The directors recommended that £300 be transferred to the reserve fund, and that £1,032 6s. be divided among the stockholders, which would be equivalent to a dividend of 9 per cent. *The introduction of clay instead of iron retorts it was thought would be a permanent advantage.* It was recommended that the shareholders reduce the price of gas to private consumers from 5s. 5d. to 5s. per thousand cubic feet, and the public lamps from 65s. to 60s. each. The report was adopted by the meeting. A large increase in the consumption of gas had taken place in Lewes, which was attributed to the reduction in price.

Gas in Scotland.—The Glasgow Gas-Light Company in their report say, that notwithstanding the reduction of their price of gas from 5s. to 4s. 7d., they are prepared to pay a dividend of 10 per cent. on old stock, and 7½ on new. This company have a reserve fund of £26,761, from which they propose to aid the dividend with a sum of £1,518.

Gas in Wales.—The fifty-first half-yearly meeting of the Cardiff Gas-Light and Coke Company has been held. The report stated that they had reduced the maximum charge of gas in the borough of Cardiff from 4s. 3d. to 3s. 10d. per thousand cubic feet. They had also made a very considerable reduction in the charge of meters hired from the company. The directors trusted that the reduced charge would lead to an increase in the consumption of gas, and hoped they would, at no distant period, be enabled to announce a still further reduction. The usual dividend on the old and new shares was declared.—*London Builder.*

Gas in Spain.—In Seville, during the six months from July 1st, to December 31st, 1861, there was an increase of from 1,200 to 1,302 public burners, and from 3,760 to 3818 private burners. The quantity of coal carbonized was 46,216 quintals, producing 570,000 cubic metres of gas.

Gas in Germany.—The municipal administration of Frebuigen have made a loan of 175,000 francs at the rate of four per cent. per annum, for the construction of gas-works in that town.

At Cologne, the Imperial and Continental Gas Association, of which the privilege will expire in 1865, have obtained authority to erect a second gas-works.

At Dresden the construction of a second gas-works has been decided upon by the municipal authorities.

At Mayence, an association of consumers is being formed for the erection of a new gas-works, with a capital of 650,000 francs, on condition that gas is to be sold at 8 francs 75 centimes, per thousand cubic feet.

At the old city of Halle, celebrated for its university, gas-works have been in operation since August, 1860. The mains extend a distance of 100,000 yards; 527 public lamps, and 5,265 private burners, are furnished with gas. The quantity of coal carbonized amounted to 11,440 tons, producing 15,946,400 cubic feet of gas.

Water pipes in Cities.—In the city of New York there are laid 280,270 miles of water-pipes of all sizes; in Boston, 131,295 miles; in Chicago, 95,288 miles; and in Cincinnati, 86,880 miles.

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WEDNESDAY, OCTOBER 1, 1862.

The opposition to the course of our City Gas Companies in raising the price of gas has called forth from many sources expressions of disapprobation, uttered with a degree of emphasis beyond that ordinarily used. In our last issue we printed extracts from our daily and weekly contemporaries, showing the unanimity with which the selfish action of the companies was condemned. In another column will be found some additional evidences of the "spirit of the press," all taking the same view—regarding the grasping policy of the companies in the light of a gross and glaring imposition. The suddenness of these thrusts of the pen, combined with the vigorous manner in which they have found expression, together with the warnings of a guilty conscience, have forced at least one of the metropolitan gas companies, the New York, to acknowledge their error by withdrawing the resolution to add the gas tax to the bills of consumers, and to assume it themselves, and thus bear their share of the burdens of the war. Rumor says the Manhattan Gas Light Company will likewise reconsider their action in the premises, and follow in the footsteps of nearly all the loyal gas companies in the country, by paying the tax themselves. However, these eleventh hour conversions may seem to have been brought about more by the fear of the consequences of continued waywardness, rather than by a sincere love of virtue, let us accept them as indications of true repentance, and hope that the future course of these gigantic corporations may show a determination to be henceforth liberal and accommodating, and to remember the often quoted text—"the love of money is the root of all evil."

But besides expressions of disapprobation of the course of the of the gas companies in trying to make their consumers pay the tax which Congress intended that they (the companies) should pay, correspondents and editors have endeavored to point out remedies; and last, but certainly not least, the city Councils have taken the matter in hand, and propose to take the management of the gas companies under their control, which, it is thought, by the terms of their charters they have the right to do. Whether this will amount to anything more than mere talk remains to be seen. In the meantime it will not be amiss to note some of the objections to such an arrangement, and to ask the question whether consumers would be any better off than under the present system of management.

Now, although at a first glance the question of having gas-works in a large city under municipal control may seem to be proper and just, yet on weighing the subject well, and viewing it in all its bearings, the arguments against such an arrangement are strong and cogent; and, particularly in view of the political character which would be fastened on the administration of a business which is of a purely technical and scientific nature, the bare idea is suggestive of apprehensions. In England and other European countries the proportion of municipal gas-works to those under private management is very insignificant, and in those countries the preference has nearly always been given to private corporations. If this be so in England, a country where the frequent political wranglings inseparable from our institutions are unknown, how much stronger is the objection against municipal gas-works here, where political changes are of so frequent occurrence, and in this city, where so much corruption and peculation is indulged in by those having charge of the government. Is any place in the world so completely at the mercy of designing politicians as the city of New York? And is there any other municipality governed by a class of politicians whose standing, moral, social, and political, is more degraded? Of course there are individual exceptions, but they are few. If the gas-works pass into the hands of these persons, what are consumers to expect? Can any sane man seriously hope to be benefitted by such a change? Is it to be supposed that gas will be manufactured in a state of greater purity, or that the complaints of consumers will be at all lessened? These results have never been attained in any other city where the gas-works are under municipal control, and it is hardly to be expected that they should be realized here. What benefits then can possibly accrue from the city taking charge of the works? Some reply, a reduction in the price of gas. But how is this to be brought about? It is well known that the profits now pocketed by our gas companies are enormous, and that their business is remunerative to a degree which is seldom reached by any similar corporations; but this is due alone to the efficient management of the engineers having the works in charge. Let a novice be placed in control, and the profits would vanish, and would only be reckoned among the things that were. It is true that this is no excuse for maintaining a high price when circumstances will allow of a reduction; but it shows that thorough acquaintance with the practice of gas-making is necessary to produce like results, and that under a management unused to such details, very different consequences would ensue. In fact, if the works ever come into possession of the city, the expense of running them will be so increased that a material reduction in price, such as most consumers would clamor for, would render the works dependent upon the city for support, and instead of being a source of profit, or even self-sustaining, appropriations would have to be made for their benefit at the expense of the tax payers of the city, and the result would be only transferring a burden from one shoulder to the other—robbing Peter to pay Paul. The municipal gas-works already existing in the United States, with the prices charged per thousand cubic feet, are as follows:

Alexandria, Va., ...	$3.50
Frankfort, Ky., ...	4.50
Philadelphia, Pa., ...	2.00
Richmond, Va., ...	3.00

In Philadelphia the price has been lately reduced from $2.25 per thousand cubic feet, to $2.00, but the superior brilliancy of New York gas renders it nearly as cheap at $2.50 as the Philadelphia gas at the reduced rate. Thus, price is not always a true criterion; for a low-priced poor gas is dearer than a high-priced gas of high illuminating power. The other city gas-works in the above list sell their product at quite as high prices as private companies in towns of similar size, so that in this respect we cannot see that municipal works offer any inducements superior to those managed by private corporations.

When the magnitude of the business done by the two large New York companies is taken into consideration, we need look for no stronger argument against the assumption of their direction by the municipal authorities. The purchasing of the hundreds of thousands of tons of coal, the buying of machinery and appliances necessary to carry on the business, the control of the thousands of hands directly and indirectly employed, would open up to unscrupulous politicians many rich jobs, and peculations without number would be committed. In fact, we cannot perceive where any benefits can possibly accrue to consumers by the proposed change, but on the contrary, we can forsee with many apprehensions the dangers to which they may be exposed if the Councils carry their point, and obtain the control of the gas-works.

But others reason that the companies are overbearing and unaccommodating to their consumers, and that they exact compliance with harsh and tyranical rules. Perhaps this is so. We have had occasion to speak of the overbearing spirit of gas companies before now, and have censured it unsparingly. But private gas companies are not alone in this category. In all places, and under whatever management, gas is sold by meter; and there will always be found those who are disposed to dispute bills upon the most trivial pretext. We have known municipal gas companies to assert their claims with a demeanor quite as haughty as any private company, and to force compliance with quite as strict rules. We have heard the gas company of Philadelphia denounced by consumers there in an unsparing manner, for enforcing their regulations; and in the same city we have heard complaints against the registration of meters, all uttered with the same vehemence and abuse of the company, as might be heard against a private corporation in any other place. We have published reports of suits brought against city gas companies by consumers who deemed themselves wronged, and who made quite as serious charges of fraud against the companies as if they had been owned and controled by private parties. One of these cases may be found reported on page 311 of our second volume, where a consumer refused payment of a bill brought against him by the Philadelphia Gas Company, on the ground that it was excessive. The company brought an action against the consumer, but the sympathies of the jury being opposed to the former, quite as much so as if it had been a private corporation, the defendant won the case. The newspapers of Philadelphia commented on the suit at the time, handling the plaintiff without gloves, and could hardly have made stronger intimations of injustice and wrong than they brought against the municipal gas company. In the same city strict regulations are prescribed by the company which consumers must comply with. A daily paper commenting upon the case above referred to says:

"An applicant for the use of gas has to subscribe his name to a voluminous body of terms and conditions, printed in the front part of a big book. Nobody ever reads this document, few signers see it or know of its existence, but if an unsophisticated citizen afterwards gets into a dispute with the gas office, something is sure to be fished up from this lake of darkness, and exhumed from the multifarious contents of these terms and conditions, which will generally have the effect of showing that he is in the wrong, and cannot possibly have any rights."

These remarks, which hundreds of consumers in Philadelphia will endorse, do not apply to an "odious monopoly" in our sense of the term, but to a municipal gas company—that haven of rest which so many verdant consumers regard with longing eyes.

Another argument used in favor of placing the gas-works under the control of the municipal authorities, is that they already have the business of supplying the city with water, and that the furnishing

of light should be as much of the city's business as the distribution of the water-supply. We cannot see the force of this opinion—for argument it cannot be called. Gas-light and water-supply, although necessary to the comfort of a large community, are not equally so. The distribution of a water-supply is a prime necessity, and properly comes under the management of the city, for it is in one sense a sanitary measure of the highest importance, and as such the water-works should be under the same control as the streets and sewers. Gas-light, on the contrary, although essential to comfort in all large towns and cities, is not an absolute necessity, as is water, and may be dispensed with without any disastrous consequences to the public health.

We have above referred to the increased sources of fraud and peculation which would be opened up to designing politicans in the event of the Councils of the city obtaining control of the gas-works. These worthies would desire no richer mine in which to delve. The patronage which they would have to bestow, and the contracts they would have to make, would give them a succession of rich jobs, in comparison with which the Japanese swindle would sink into insignificance. Can the citizens of New York forget the frauds which have attended nearly every public measure inaugurated by the Councils? To chronicle all of them would fill a volume. Shall more avenues to corruption and dishonesty be opened? We hope not. Better put up with anything from the present gas companies, than to hand over consumers to the tender mercies of Mr. Alderman this, or Mr. Councilman that. Let Boole and Tuomey and their colleagues vaporize as much as they please in their own spheres, but let them not aspire to positions beyond their ken. Party intrigues and gas-works require very different kinds of engineering, and however proficient politicians may be in the former, we fancy they would make a sad botch of the latter.

Is there then no redress then for the oppressive policy of the gas companies? We think the remedy is easy, and one which may be safely applied. Let the exclusive privileges of the monopolies be repealed. Let the doors of competition be flung wide open. A few opposition companies would produce a wholesome result, and would impart a spirit of life and energy to the business of making gas, which would have a happy effect on all concerned. This effect has been reached in the city of London, and the same results would follow here. That city, with a population not much more than three times greater than our own, has thirteen gas companies. This is one reason of the low price for gas which rules there. Can any one doubt that under similar circumstances such results would be attained here? We think the plan feasible, and hope such measures may be adopted as will stir up the people to a sense of their rights, and get them to move in earnest. Let a few more opposition works be started, and let consumers pledge themselves to stand by the new companies, and we predict the two mammoth corporations which now rule with such absolute sway, will come down a peg or two from their lofty eminences, and condescend to be reasonable and fair to the people who have made them what they are. In addition to this, let a stringent inspection law be passed, and an inspector be appointed, whose duty shall be to make daily examinations of the gas, and let such penalties be enforced that compliance with the law will be imperative. Let the candle power of the gas be definitely prescribed, and then consumers will feel that they are at least occupying equal ground with the companies; and that in buying gas are they giving an equivalent for what they take, and are not merely accepting a favor, which their high mightinesses, the companies, graciously condescend to bestow. The State Legislature will soon be in session, and we commend this subject to consumers in this and every other city, where they have had just ground of complaint.

REPENTANCE OF THE GAS COMPANIES.

Some of the companies have repented of their recent attempt to transfer to the shoulders of the people the tax which they, out of their enormous profits, ought to bear. This repentance is not yet universal, nor is it of the right kind. There is a "repentance to be repented of," and this is believed to be of that sort, having been caused by the fear of punishment.

Now it will do no harm to refer these soulless institutions to one or two texts on the subject of repentance, which apply to the directors and officers personally. They cannot spend next Sunday better than by reading and pondering upon Proverbs xxviii., 13; Ezekiel xviii., 31; Matthew v., 26, and xxvii, 3. There are others distributed through the New Testament which can be easily be found if there is any disposition to prosecute the subject.

The New York Gas Company fearing an overhauling at the hands of the Legislature, have backed out of their inexcusable attempt to avoid the tax. The Manhattan Company have not as yet, as we are informed, retraced their steps, hoping that the peace-offering of the old New York may satisfy the public clamor, especially as the larger shareholders are nearly the same in the two concerns, but this will not do. The Manhattan must back down clean and entire. Nothing short of it will be satisfactory.

The old Brooklyn has backed down, *of course*—this concern is ready to slide either way the pressure compels. The Troy, N. Y., has backed out fearing the Legislature would take it in hand after the noise created here. The Williamsburgh, N. Y., sticks to it and will probably do so until the Citizens' (opposition) pipes are laid side by side with its own. The majority of the stock of this company is owned or controlled by Willets & Co., a wealthy Quaker house, which accounts for its firmness in this matter. It must sooner or later give way, and the sooner it does the better.

The Albany, N. Y., Company will not charge the tax so long as it can continue to pay eight per cent. dividend to its shareholders. We had a very pleasant interview with the president, Mr. Pumpelly, last week; a liberal, enlightened gentleman, whose example might be followed with credit by our own presidents. He deprecates the idea of throwing the tax on the people so long as the company can pay a reasonable dividend, and eight per cent. is a very reasonable one.

The Manhattan and New York Gas Companies raised the price of coke fifty cents per ton on 24th September—an offset in part to any tax they may have to pay. Now let them be made to pay five cents a bushel on coke and be prohibited charging more than ten cents a bushel for it, and pay their own tax, and they will then be all right after we have six more opposition companies here.

THE PROPOSED TAX ON GAS-CONSUMERS.

OPINIONS OF THE PRESS.

The directors of the New York Gas-Light Company at a recent meeting, determined that the Government tax should not be added to the bills of consumers, being driven to this conclusion by the spontaneous burst of indignation, which had assumed proportions well calculated to disturb the equanimity of the advocates of the increased price.

In our last issue we gave extracts from some of the leading papers, all of which characterized the action of the gas companies as an imposition, unbearable and intolerable. We continue the list of criticisms, and present a few more opinions of the press, which, as will be seen, are united on this one point, although on all other questions, much variance exists.

The *Metropolitan Record*, the organ of Archbishop Hughes, thus comments upon the notice issued by one of the gas-companies:

The shrewd and cunning manner in which the foregoing notice is worded, is calculated to convey the impression that Congress has ordered all gas-consumers to pay a tax of fifteen cents upon every thousand cubic feet of gas consumed. Now, it is only necessary to say in reply to this, that the company are not acting "in conformity with the Act of Congress," in adding "one and one-half cents per hundred cubic feet," to "all bills for gas consumed after the first day of September next." No such order is contained in the act referred to. It simply provides that a tax of the amount stated, shall be levied on all gas manufactured and consumed, but it does not say that the burden shall fall upon the consumer. It is, therefore, not only absurd, but unjust towards the public, to issue such a notice, and to insist therein that the company is acting "in conformity with the Act of Congress." The least the company can do, is to bear a fair share of the burden of taxation, but it is unjust to impose the whole upon the public.

The conduct of the gas company of Philadelphia is in marked contrast with that of New York, and deserving of the highest commendation. The following is the arrangement which they made at a stated meeting, held on the 28th of last March, and we think our citizens ought to demand similar action on the part of the two companies of this city:

"That upon the present price of gas to consumers—viz., $2 25—there shall be in lieu of the present allowance of five per cent., an allowance of one-ninth for prompt payment, so that the cost to prompt-paying consumers, will be $2 per thousand cubic feet, to take effect on the first day of July next, unless the tax proposed in Congress shall sooner take effect, in which contingency this reduction shall take effect at the same time."

The *Times* expatiates on the subject as follows, and quotes a portion our editorial remarks on the action of the companies as the suggestion of a "correspondent." The Brooklyn company here referred to is not the old company, but the Citizens' (opposition), which had the fairness to assume the tax at the start. The *Times* says:—

On sundry and divers occasions we have, in a mild and gentle way, called the attention of our great gas companies to certain little facts already sufficiently impressed upon the public mind; but, so far as response is concerned, with no effect. In the same genial manner, and with the same general groundwork of fact, we improve this morning's issue by asking if the gas companies whose stock is now rating respectively at 70 and 120 per cent. above par, really intend to carry out the cheerful programme which announces the imposition of the National tax upon the monthly bills of their customers?

It is a subject in which we are all interested, and one which, despite the great pressure upon our columns, we intend occasionally to introduce here.

The Brooklyn company sets a noble example in this regard. It takes no notice of the daily attacks made upon it by interested parties through the newspapers, but quietly notifies such of its patrons who are in doubt upon the subject, that the tax will be borne by it and not by them.

Which of our New York companies will follow so just a course? We can but agree with a correspondent who, in speaking of this well-called imposition, says: "The minds that conceived, the tongues that advocated, and the hands that perpetrated this outrage upon the people, are a disgrace to their possessors. Here are corporations making over one hundred per cent. per annum profit, dividing annually from twenty to thirty per cent., and investing the remainder in additional works, unwilling to bear the least share of the nation's burden."

The Common Council of this city has already determined to try the right of the city to assume the charters of these companies, and we hope they will do it. The gas which we now burn can be made for less than $1 15 per 1,000 cubic feet, *first cost;* from that deduct the sales of coke and tar, and the cost of the gas is reduced to a good deal less than $1.

In conclusion, the reminder that New York is a large place, and could easily accommodate half a dozen such corporations, may not be unsuggestive to our avaricious and somewhat despotic servants.

The *Scientific American* follows up the blows struck last week by the following remarks:

The gas companies of New York charge so high a price for their gas that the business is enormously profitable. This is proved by the fact that none of the stock of these companies finds its way into market; the owners holding it with miserly care as their most lucrative investment. These great profits are the result of special privileges granted to the companies by legislative enactment—privileges not shared by the rest of the community. Notwithstanding these advantages, these rich monopolists are the very first to set the unpatriotic example of trying to shirk their share of the tax, and to shoulder it off upon people less able to bear it. We see that the gas companies of Philadelphia have pursued a more honorable course, having resolved to pay their tax out of their own profits. We cannot but think that the action of our companies has been without sufficient consideration, and that these wealthy concerns will, on reflection, be most ready to contribute their share of the public burdens.

Since writing the above, we see that our gas companies have probably killed the goose that laid their

golden eggs, by this little extra strain of their greediness. A resolution has been adopted in the Board of Councilmen, directing the Counsel of the Corporation to prepare the necessary papers to transfer all the rights and privileges of the New York and Manhattan Gas-Light Companies, to the city, in consequence of their expressed determination to make an extra charge of fifteen cents for every thousand feet of gas consumed by their customers after the first instant.

The *Long Island Star*, a well edited weekly, published in Brooklyn, N. Y., is more facetious in its comments. We fancy the comparison between Stonewall Jackson and gas presidents will not be relished by many of the latter, although in the eyes of loyal consumers, the action of some of them in advocating the imposition of the tax upon the people, is regarded as a monstrous dereliction of duty, almost enough to consign them to the tender mercies of his Satanic Majesty. Thus speaks the *Star*:—

We understand that the gas companies of this city and New York, have served notices on their customers, that the tax on gas must be paid by the consumers. We have heard of "cheek" and "brass," but this is the most cheeky operation that we have heard of for a long time. There is scarcely a gas company that does not realize its fifty per cent. profit, and some are said to make over one hundred; and yet they would add a contemptible five cents per thousand feet to the poor consumer. The amount is trifling, but it was the last pound that broke the camel's back. We have often heard that corporations have no souls, but this rather proves the assertion. With short time on street lamps, tax on gas, and tearing up and ruining streets, the companies will eventually make a living, no doubt; but as a friend of ours said of Stonewall Jackson the other day—"if the devil don't get the presidents of the gas companies, there is no use in having a devil."

Sewerage of Chicago, Ill.—There are now laid in Chicago 54½ miles of public sewers. The state of the Sewerage Funds has prevented any considerable extension of the Sewers during the year, but the works have been kept in good repair throughout, and are now everywhere serviceable and in general good order. The few sewers that had been laid during the year, have generally been built by means advanced by individuals benefited by their construction.

The cleaning and repairs of the sewers for the year 1861 cost $8,425 79. Considering the extent of the sewers, this amount is certainly not large, but it is hoped that it may be even less than this amount during the present year. Besides the public sewers, there are in connection with them 2,437 private drains, constructed under the supervision of the Sewerage Board. Mr. W. H. Clarke, besides his other duties as Assistant Engineer of the Board, has the special charge of private drains.

Alcohol from Coal-Gas.—The French scientific papers are full of a discovery recently made by a young chemist, named Cotelle, by which he is able to extract alcohol from coal-gas. The alcohol is said to be of a very superior quality, but he is enabled to sell it at twenty-five francs the hectolitre*, while alcohol of a very inferior description is sold at seventy-five francs. A company has been formed for working the patent.

It is said that a company with a capital of 400,000 francs has been formed for the purpose of carrying out this invention. The discoverer of the process says he can sell his alcohol for 25 francs the hectolitre, while the commonest kind made in the usual way is selling for 75 francs per hectolitre.

Referring to this patent, the London *Chemical News* says: This, like many other chemical patents, is utterly impracticable on the large scale. M. Cotelle has read that M. Berthelot, some years ago, succeeded in transforming olefiant gas into alcohol by the intervention of sulphuric acid, and has jumped to the conclusion that as coal-gas contains a considerable quantity of olefiant gas, he has only to shake it up with sulphuric acid to produce alcohol as he likes. We have seen M. Cotelle's patent; in it he claims to produce alcohol of good flavor by means of purified lighting gas passing over (*traversant*) liquid sulphuric acid, or by bringing it in contact with the acid in vapor (*avec l'acide en vapeur*). Our readers, who know the long and tedious operation by which even a minute trace of alcohol can be produced in this way, will not envy the shareholders who have subscribed with such wonderful rapidity.

*A hectolitre is equal to about 22 gallons.

LEGAL RECORD.

Sidney Shepherd, Respondent, *vs.* The Milwaukee Gas-Light Company, Appellant.

On page 11 of this volume, we published a short notice of the decision in the case of Sidney Shepherd against the Milwaukee GasLight Company. As this is a case of some importance to gas companies generally, we now publish the opinion of the Court in full:

The material facts in this case are as follows: The defendant is a chartered company or corporation, having the exclusive right to manufacture and sell gas for the purpose of lighting the city of Milwaukee, and the places of business and residence of the inhabitants of said city, according to the terms of a contract entered into originally between John Lockwood and said city, and in conformity with the duties and obligations resulting from the act of its incorporation.

The plaintiff was a merchant doing business on East Water street in said city, along which the gas-pipes of the company were laid, and had fitted up his store with the necessary pipes, tubes, burners, and apparatus for lighting it with gas. He then applied to the company to furnish him with gas, and tendered five dollars in advance payment therefor. The company, before they would furnish the gas, required the plaintiff to sign what purported to be an agreement, and was at least a promise to take gas according to the rules and conditions contained in the "printed rules and regulations" of the company, which were introduced in evidence. This the plaintiff refused to sign, and for that reason and none other, the company refused to furnish him with gas. The plaintiff then brought his action to recover damages of the said company for such refusal, in a Justice's Court, claiming damages to the amount of $100, when the defendant obtained judgment, and the plaintiff appealed. The County Court reversed the judgment of the justice, and gave judgment for the amount claimed and costs. The defendant now brings the case here by appeal, to be reviewed.

We understand that this case comes before the Court in entire good faith, and with a sincere desire to arrive at the just rights of the parties. It has been argued with great ability and candor on both sides, and we have given the question involved a consideration beyond what was necessary to a determination of this particular appeal; indeed, we were informed upon the argument that it was the desire, particularly of the appellants, that this Court should review their regulations and pass upon their validity. We therefore enter upon an examination of their "regulations," so far as we deem it necessary, not only without embarrassment, but greatly aided by the full and candid arguments which have been submitted.

It is conceded that there are but two questions necessary to be decided: first—Was the gas company bound to furnish the plaintiff with gas under the circumstances of preparation and fixtures admitted to have been made upon his complying with such conditions as the company might rightfully impose? and, second—If so, whether the company could rightfully require the plaintiff to sign the agreement, promise, or regulations, mentioned, before he was entitled to demand and have gas supplied by them upon a tender of the usual rates of furnishing gas?

It must be recollected that the fixtures and all apparatus of the plaintiff for receiving and using the gas were perfect, and the only reason for refusing to furnish the gas was, that the plaintiff refused to sign the "regulations" prescribed by the company.

Although the County Judge says that the first question was conceded in favor of the plaintiff on the trial below, yet we do not understand it to be conceded here, and we therefore proceed to examine the question.

That the company were empowered to impose reasonable regulations upon such of the citizens of the city of Milwaukee as might desire to be furnished with gas, we have no doubt. But the question is, whether the citizen willing to submit and conform to all such regulations as the company might rightfully impose, was entitled to demand of, and be supplied with, gas by the company? In other words, was not the company bound to sell their gas at the usual rates to all and every citizen of Milwaukee, who was prepared by pipes and the necessary fixtures, for its consumption and use, at the usual rates, upon compliance with such conditions and regulations as the company might rightfully impose?

In examining this question, it is not deemed necessary to examine critically the contract of Lockwood with the city, or the charter of the gas company in detail. It is sufficient for the purposes of this case to know that the company had the exclusive right to manufacture and sell gas, and that hence, the only means of supply available to the citizens, was through the agency of the company. It is within the everyday experience of us all, and hence within the judicial knowledge of the Court, that the manufacture and supply of inflammable gas for the purpose of lighting cities and dwellings, is not a domestic or family manufacture. It is carried on either by public or associated capital, and is dependant for its profit upon general consumption. Corporations of this kind are not like trading or manufacturing corporations, the purview of whose operations is as extensive as commerce itself, and whose productions may be transported from market to market, throughout the world. Their product is designed for the consumption of the immediate community in which the manufacture is wrought. It is not a trading corporation, for its product depends exclusively upon home consumption. If gas were an article of merchandise, and could be bottled or packed up and imported or exported like soap, candles, or hats, to be distributed to the various marts of commerce, there might possibly be claimed for it the character of merchandise or manufactures partaking of that attribute. But such is not the fact. Its manufacturer depends upon the consumption of the immediate neighborhood for its profit and success, and upon no other place. It is local, and hence not commercial. It is consumed upon the spot of its manufacture, and hence can have no alliance with articles of trade. Its success necessarily depends upon its general use in the vicinity of its manufacture, and seriously affects the public policy and convenience of the immediate community. The gas is not *sold* to whomsoever will pay, but is offered to be, and is furnished to whomsoever is prepared to, and will take and use it. It is not an article of trade, because it is not bought, measured, and delivered in quantity, but is furnished, used, and to be paid for after it is used, because it cannot be measured before. From the nature of the article, the objects of the company, their relations to the community, and from all the considerations before mentioned, it is to me apparent that the company is not at all analogous to an ordinary manufacturing or trading company.

But, it is asked, would a soap or candle factory, or a hat or carriage factory, with the privilege of laying pipes in the public streets, make it a public corporation and oblige the company to furnish soap, candles, or carriages, to any citizen upon tender of a fair compensation. Perhaps not; the citizen could procure his soap, candles, or carriage, elsewhere. These are all articles of trade, capable of transportation from place to place, and, as is sometimes alleged, the incorporation of companies for their manufacture, does not interfere with the rights or privileges of private citizens. But, suppose the citizen was prohibited from obtaining soap, candles, or carriages from any other than the particular corporation, how would the case stand? Could such company wantonly refuse to sell the citizen upon the usual terms?

However, if these reasons are insufficient to distinguish the character of this corporation, we proceed to examine another, which, to our mind, is conclusive, viz., the exclusive privilege conferred upon the company, to manufacture and furnish, or sell the gas.

The very fact of this exclusive right conferred upon the company, to manufacture and sell gas in the city, to be consumed therein by citizens thereof, would imply an obligation on the part of the company to furnish the city and citizens with a reasonable supply, on reasonable terms, and when the nature and objects of the corporation are considered, viz., the exclusive right to manufacture and sell gas *for the purpose of lighting the city of Milwaukee and the dwellings and business places of its inhabitants, &c.*, how can it be urged that this is a mere private corporation for the manufacture and sale of a commercial commodity? Gas is not a commercial commodity. The very term is incompatible with the idea of trade and commerce.

It is not in its nature interchangeable, but merely consumable, and consumable only at the place of delivery, in the immediate vicinity of its production. If a company were chartered with the exclusive privilege of manufacturing and selling bread in the city of Milwaukee, would it be contended that the company were under no obligation to supply or sell bread to any but such person or persons as the company should capriciously select? Odious as were monopolies to common law, they are still more repugnant to the genius and spirit of our republican institutions, and are only to be tolerated on the occasion of great public convenience or necessity, and they always imply a corresponding duty to the public to meet the convenience or necessity which tolerates their existence.

The successful operation of this gas company, worked a radical change in the mode of lighting the streets and dwellings and places of business in the city, and created thereby a sort of necessity for the article, to produce which, the exclusive privilege was conferred upon them, and hence they assumed the correlative duty of supplying this necessity.

We think there can be no doubt that the company were bound to furnish the gas to the plaintiff upon his complying with such reasonable conditions or terms as they might rightfully impose.

The only reason urged for refusing to furnish the gas to the plaintiff was, that he refused to sign the regulations adopted by the company. This leads us to examine those regulations, and to determine whether or not they were such as the company could rightfully require the plaintiff to subscribe to, as a condition precedent to his right to demand the gas.

We shall not attempt to discuss all of these regulations separately, though we are requested to do so, but shall only point out some of them which we think are unreasonable, and which the company had no right to impose.

But, before doing so, we wish to be distinctly understood that, in our opinion, they have a right to make all such needful rules and regulations for their own and the convenience and security of the public, as are reasonable and just, and to exact a promise of conformity thereto, but these rules and regulations must be reasonable, just, lawful—not capricious, arbitrary, oppressive, or unreasonable. Were it not so, the whole net-work of pipes and machinery would be at the mercy of the careless, the fraudulent, or the malignant. From the nature of the article produced and used, great care is requisite in its management, and there is a kind of implied duty or obligation resting upon those who use the gas, to use it in such a manner as not to injure or endanger others who use it. Hence we see no objection to a rule or regulation of the company requiring application for gas to be made in writing, and requiring the applicant to sign reasonable regulations.

The 3d rule of the company allowing the company to demand security for the gas consumed, or a deposit of money to secure against loss, appears to be just and necessary to guard against loss. As the delivery of the gas is necessarily to its consumption, and as the amount delivered is ascertained by the amount consumed, it would seem to be just and right that the company should not be compelled to furnish without reasonable security for payment, in convenient amounts, and at proper periods.

The 9th rule is also objected to as illegal. This authorizes the company, by their inspector, to have free access, at all times, to buildings and dwellings, to examine the whole apparatus, and for the removal of the meter and the service pipe.

The gas apparatus in the buildings, stores, and dwellings, is the property of the individual, put up at his own expense, in which the company have no interest. It may be proper for the company to have the right of inspecting the gas apparatus, to determine its sufficiency, and at stated periods, to inspect the same, or, perhaps, upon reasonable notice therefor. But, certainly it cannot be necessary that the dwellings of gas consumers should be subject to instantaneous visitation at all times, without notice. Nor is it to be conceded that the company should have the right at all times to enter the premises and remove the service pipe and meter, at their pleasure. This regulation is too general and cannot be upheld, or at least a party cannot be required to subscribe to it, to entitle him to be furnished with gas. Another regulation (14) reserves to the company the right at any time to cut off communication of the service pipe, if they shall find it necessary so to do, to protect the works against abuse or fraud. Here the company assume the whole power to decide upon the question of abuse or fraud, either in fact or in anticipation, without notice, without trial, of their own mere motion. This summary jurisdiction would not be given to any of the judicial courts in any case, but of the most urgent emergency. Much less could it have been the intention to confer such power upon one of the parties to a contract of such vital importance. It is no hardship to the company to resort to the same tribunals, upon like process, for protection against fraud, as the law provides for individuals.

Rule 16 provides that after the admission of gas into the fittings, they must not be disconnected or opened, either for alteration, or repairs, or extensions, without a permit from the company, which may be obtained at their office, free of expense; and any gas-fitter or other person who may violate this regulation, will be held liable to pay treble the amount of damages occasioned thereby.

It is not to be allowed that the gas company can impose penalties in this way, or make the submission to such penalties, the condition precedent to the right of the citizen to be furnished with gas. It is singular if the Legislature has given to the gas company the right to inhibit the citizen from altering the arrangement of his gas apparatus in his dwelling, without their assent first had and obtained, or from extending the same; and still more singular, that the company should claim the sovereign right to inflict penalties upon him for doing so, and not him only, but upon any other person who should act in the matter, without their consent. The statement of this proposition is its answer.

Rule 17 provides that the company shall have the right to substitute alcohol for water in the meter, and charge therefor. All that is necessary to observe upon this regulation is, that the company are entitled to charge for the gas consumed, and that some accurate mode of measurement must be used, whether of alcohol or water. The consumer must pay the legal rates for quantity consumed, and the mode of measurement, whatever it is, must be correct.

Rule 12 assumes for the company the power to make any other rules or regulations, from time to time, under which the gas company will furnish private consumers, and experience shall suggest, &c.

What we have said before as to the power of the company to prescribe reasonable rules and regulations, is a sufficient answer to the questions raised, or which may be raised thereon.

It is not necessary to go further—indeed, we might have stopped much earlier, and would have done so, but for what we understood to be the desire of the parties for a full examination of all the questions involved in this action.

Without recapitulation, we have no doubt that the judgment of the County Court was right, and that judgment ought to be and is affirmed with costs.

STATE OF WISCONSIN, } ss.:
Supreme Court, }

I, La Fayette Kellogg, clerk of the Supreme Court of the State of Wisconsin, do hereby certify the above and foregoing to be a true and correct copy of the opinion of the Court in the above-entitled cause, now remaining on file in my office.

[SEAL.] In witness whereof, I have hereunto set my hand and affixed the seal of said Court, at Madison, this 20th day of September, A. D. 1858.

LA FAYETTE KELLOGG,
Clerk S. C.

NEWBURYPORT, MASS.—The Gas-Light Company of this place have not only assumed the gas tax, but have also reduced the price of gas 60 cents per thousand cubic feet. This is an example well worthy of imitation.

CHICAGO, ILL.—Our old friends, Messrs. R. D. Wood & Co., of Philadelphia, Pa., have been engaged in filling a contract for some 400 tons of 4, 6, and 8-inch pipes for the Board of Public Works of Chicago.

PUBLIC LIGHTING IN ENGLAND.

The following account of a misunderstanding with reference to the public lighting of the city of Reading, England, we take from the *Journal of Gas-Lighting:*

A controversy having arisen between the local authority of Reading, and the two gas companies of that town, respecting the terms of public lighting, a draft of a contract was prepared by the board with the aid of Mr. S. Hughes, to which the consent of the company was required; and, among several other monstrous requirements, it was proposed to refer to arbitration the determination of the price per 1,000 feet, at which gas should be supplied in Reading to private consumers, as well as to the public lamps, "the calculation to be based on 7 per cent., on a properly-expended capital," the companies being at the time entitled to receive dividends of 10 per cent. The local board urged as reasons for these demands—and we quote their reasons with great satisfaction, as strongly confirming our views of the usual results of competition—that one of the Reading gas companies, having "obtained its parliamentary powers on the express ground of competition with the other company, yet, in disregard of this, the very condition of its existence, this company entered into a combination with its rival, thus establishing a monopoly of the worst description;" in consequence of which, the price of gas was fixed "with reference to the amount of profit which must be obtained in oader to pay handsome dividends on an unnaturally exaggerated capital, and, at the same time, to maintain, at the public expense, the costly extravagance of two separate works, and two distinct companies, with their double staff of directors, officers, and other expensive appendages." The gas companies, when called on to resign the privileges conferred on them by Parliament, and to place themselves under subjection to the local board, refused at first to obey the summons; however when about to come before Parliament to procure an Act for amalgamation, they entered into a compromise with the board, by which they sacrificed all they had been contending for, and they have formed a precedent that may be referred to in subsequent legislation, greatly to the detriment of gas companies. The Act they have obtained under these circumstances, contains the following provisions: That the capital of the amalgamated company shall be £40,000, consisting of £20,000 old capital, on which not more than 8 per cent. dividend is to be paid; £5,000 of invested profits, bearing a dividend not exceeding 5 per cent.; and the new capital of £15,000, to be created under the Act, is to bear a dividend not exceeding 7 per cent. It is further enacted, that if a larger dividend be at any time necessary to make up the deficiency of any previous dividend at the prescribed rates, the making up of such deficiency shall be limited to two years from the period at which it occurred. When the whole of the new capital is raised by the issue of shares, the further sum of £10,000 may be borrowed. The company are bound to provide and maintain all main and service-pipes, which must be constructed of the best materials, and so as not to suffer any interruption to the proper supply of gas; they are bound to erect and fix all such lamps, lamp-posts, &c., as the local board provide; and, at the request of the board, they are to remove or alter the situation of the lamps, which they are to furnish with service-pipes, stop-cocks, and all other apparatus, *except burners*. The local board are empowered to light and extinguish the lamps, but they may contract with the company, or with any other persons to do so. The company are not compelled to supply gas to lamps placed more than 80 yards apart; but, in case of wilfully failing to supply other lamps, they are liable, on a summary conviction before two justices, who may be members of the board, to forfeit to the local authority, £20 for each offence, and a further penalty of £5 for every day during which the offence continues. All private consumers may demand to be supplied with gas at a distance of 50 yards from the main, provided they contract for not less than two years to pay gas-rates equal to 10 per cent. on the outlay of the company; and the latter may demand security for the payment of the gas-rate, before laying down the service-pipes. The following is the clause fixing the maximum prices at which gas is to be supplied to different classes of consumers:

"The highest charge of the company for gas supplied

by them shall not, at any time, exceed the rate of six shillings and sixpence for 1,000 cubic feet; provided that the charges for gas supplied by them, *within the borough of Reading*, shall not, at any time, exceed the following rates per 1,000 feet; that is to say:

To consumers of less than 10,000 cubic feet, half-yearly..... 5s. 0d.
To consumers of 10,000, but less than 20,000 cubic feet, half-yearly..... ..... 4 9
To consumers of 20,000, but less than 40,000 cubic feet, half-yearly..... . 4 6
To consumers of 40,000, cubic feet or upwards half-yearly..... 4 3
For gas supplied to public lamps..... 3 7"

The clause relating to the illuminating power and the purity of the gas is copied from the Metropolis Gas Act, the illuminating power being fixed at 12 sperm candles. The provisions for testing the quality of the gas are similar to those of most other gas acts. There is some mystification about the following clause—the 93d—providing for keeping the mains constantly charged with gas, that we do not profess to comprehend: "The company, unless prevented by necessary repairs, or unavoidable accidents, shall at all times keep all their main pipes, and branch communication and service-pipes, fully charged with gas at a sufficient pressure; *and the stop-cocks shall be so made and turned as not to prevent the branch or service-pipes being at all times so charged.*" The gas supplied to the public lamps is to be consumed by meter or otherwise, at the option of the local board; and when meters are employed, they are to be provided at the cost of the board, "but the company shall not at any time require that meters be affixed to more than one lamp in every twelve lamps then supplied with gas under this Act." The company are to furnish meters to private consumers rent free, in all cases where the consumption exceeds 2,000 feet in the half-year; and, when meter-rents are chargeable, they are not to be charged more than 15 per cent. on the outlay of the company. The provision of the Metropolis Gas Act, protecting an incoming tenant from being charged the arrears left unpaid by the former tenant, is introduced; but power is given to the company, when the supply of gas is discontinued, to enter the premises, after giving twenty-four hours notice, to remove the meter and fittings. As a *finale* to the concessions made by the company to the local authority, it is provided by the 116th clause that, whenever the board "deem it necessary to require the company to raise, sink, or otherwise alter the situation of any of the mains, pipes, stop-cocks, plugs, syphons, or branches, laid down for the purposes of this Act, the company shall, at their own expense," alter the same, "in such places and in such manner as the local board shall think right and proper;" and, in default, the board, or any person acting under their authority, may do the work required, and obtain payment of their expenses from the company; the amount to be levied by distress, if payment be refused.

The foregoing outline of the principal clauses of the Act, will show how the amalgamated gas company of Reading have allowed themselves to be bound hand and foot by the board of health of that town. The sacrific of 2 per cent. of the dividends allowed by the Gas-Works Clauses Act; the limitation of the time for making up deficiencies to two years; the power given to the local board to provide the burners for the public lamps, and to light them; the reduction of the price of gas supplied to the street-lamps to 8d. per 1,000 feet less than is charged to the largest private consumer; the quantity supplied to be measured, at the option of the local board, by meters placed to one lamp in twelve; the furnishing of meters to the majority of private consumers rent free; the compulsion to alter the position of any mains or pipes, at the pleasure of the board, at the company's expense,—are conditions which we should have thought no gas companies would have submitted to, merely to conciliate the favor of the local authority, and to prevent opposition to their amalgamation. Had they boldly met the threatened opposition, they would have obtained their Act without subjecting themselves to such injurious and humiliating conditions. No parliamentary committee, we feel assured, would have sanctioned the imposition of such terms on the companies by the local authority; and, if the attention of Parliament had been directed to the unjust provisions contained in the Act, it would not have been allowed to pass in its present form. As it is, the amalgamated gas company of Reading, are placed at the mercy of the local board, who may, in a short time, so exercise their power as to induce the company to escape from such a state of bondage, by selling their works for half their value.

THE CORNISH PUMPING ENGINE.

In the Cornish pumping engine the cylinder is steam jacketed, and a casing of felt or other non-conducting material is placed around the steam case or jacket, and over that a covering or lagging of wood, so as to give a neat appearance to the whole, and although the doors of the engine-houses are generally kept closed, yet they are never oppressively hot, thus proving how little of the heat is allowed to escape throughout the apparatus, the pipes, nozzles, and every part being thoroughly covered to prevent condensation and to obtain the greatest possible result from the fuel expended; and we may here observe that it is in the Cornish engine the useful effects of employing steam expansively have been principally shown. Mr. Michael Loam, an engineer of great experience, and whose name is connected with some of the greatest modern improvements in the mining machinery of Cornwall, has carried the expansive use of steam to a very high degree, cutting off the steam at one-quarter of the stroke in engines performing a stroke of ten feet. When the engine starts, the velocity increases towards the centre of the stroke, then it gradually diminishes until all the energy of the steam is expended; the weight of the rods and plungers, together with the stroke of water in the sinking lift, is thus raised up to the full length of the stroke, and by a well-adjusted balance the return stroke gradually takes place, causing the plungers of the several lifts to force the water, each one to the next above it, all the way up to the surface.

The high rate of duty attained by the Cornish engines is proverbial, and everybody must be a aware that where it is necessary in mining operations to employ machinery for draining, it is of the utmost importance that the whole should be practically and judiciously laid out with a view both to immediate and permanent economy. But to insure continuous economical results, very much must depend on the constructive proportions of machinery, and the careful execution of all the details. The highest amount of duty ever registered was performed by the Taylor's engine at the United Mines, Cornwall, which raised 107,000,000 pounds of water one foot high per one bushel of coal. This engine was manufactured by the Williams's Perran Foundry Company, Cornwall, a firm of long standing, and which has made some of the largest pumping engines in the world, viz., those famous engines for draining the Haarlem Lake in Holland, which has been carried out with great success.

It will, perhaps, be interesting to our readers if we here state a few particulars of this great engineering work. The bed of the Haarlem Lake is 14 feet belfow the winter level of the boezem, and when drained the maximum lift will be sixteen feet six inches to seventeen feet, according to the state of the wind, which raises or depresses the surface of the water in the canals very considerably. The water contents of the Haarlemmer Meer to be pumped out, including the additional quantity arising from the surplus rain and infiltration during the draining, are estimated at 800,000,000 cubic metres or tons. The greatest quantity of monthly drainage when the meer is pumped out is estimated at 36,000,000 tons, and the annual average surplus of rain water, &c., at 54,000,000, to be lifted on an average 16 feet high.

The Dutch Engineers were generally in favor of windmills, or a combination of wind-mills and steam-engines for pumping out the meer; but in 1841 the late King William II., by the advice of a commission decreed that steam-engines only should be employed for the purpose, and in 1842 at the suggestion of two English engineers, Mr. Arthur Dean and Mr. Joseph Gibbs, it was determined to erect three steam-engines upon the high pressure expansive condensing principle of the ordinary force of 350-horse power each, but capable of being worked on emergencies up to 500-horse power. The consumption of fuel was limited to 2¼ lbs. of coal per horse power per hour. The three engines were named the "Leeghwater," "Cruquius," and "Lynden," after three celebrated men, who had at different periods proposed plans for draining the Haarlemmer Meer. The "Leeghwater" was the first erected to work eleven pumps of 63 inches diameter, with 10-feet stroke in pumps and steam cylinders, and the "Cruquius" and "Lynden" were afterwards constructed to work eight pumps, each of 73 inches diameter, and with 10-feet stroke; each engine is calculated to lift 66 cubic metres or ton of water per stroke.

The anticipated economy in consumption of fuel has been realized: when working with the net power of 350 horses, the average consumption is 2¼ lbs. of best Welch coal, or 75 millions duty with 94 lbs. of coal, and on a late trial the Cruquius and Lynden engines were found to do a duty of 87 millions. The whole cost of machinery, buildings, coal, and wages, to pump out the lake will not exceed £150,000, whereas, by wind it would have cost £308,000, being a saving of £158,000, and there will also be a further economy upon the works in the bed of the lake, amounting to £40,000 more, so that the total saving by steam over wind will be £200,000, and three years' time.

When the state of the boezem permits the Leeghwater, Cruquius, and Lynden engines to work freeley they discharge on an average 2,000,000 tons in twenty-four hours, and they are capable of doing this down to their full depth. The engines were manufactured and erected by the Perran Foundry Company, Cornwall, and are among the most gigantic steam machinery in the world. —*London Colliery Guardian.*

THE NEW RESERVOIR.—All goes well with our splendid new Reservoir. From the moment the water was turned into it, there has not been a break or hindrance in the stream, which is pouring in at the rate of a foot of bulk per diem. Both sections of the reservoir should hold a billion of gallons of water, the maximum height of the fluid allowed in the calculation, being 36 feet. One section now contains 15 feet of the sparkling element, and there being perfect assurance that all the arrangements are complete, both sections will speedily be filled.

HARLEM, N. Y.—The Harlem Gas Company, though of later organization than any other gas company in the city, has, we understand, concluded not to impose the direct Government tax upon its friends and patrons. The other companies have already given notice of the imposition of the tax.

PATENTS.

UNITED STATES

36,277.—J. H. Connelly and John Cook, of Wheeling, Va., for Improvement in Wicks for Lamps:

We claim a tubular wick having a nap on its inner surface, substantially as herein described.

36,289.—H. V. Faries, of Indianapolis, Ind., for Improvement in Pipe Wrenches:

I claim the jaw, C, of hook form, when attached to the jaw, B, and arranged relatively therewith to operate as and for the purpose herein set forth.

I further claim the spring, D, in combination with the jaws, B C, arranged as and for the purpose specified.

36,300.—Josiah Hayden, of Haydenville, Mass., for Improvement in Water Elevators:

I claim, first, The curves, c'd c, in combination with the straight rods, a, and hooks, b, embracing the curves, c c, of another link, as and for the purpose specified.

Second, I claim the windlass wheel, W, in combination with a flat chain, constructed as herein described and for the purpose set forth.

36,305.—Harry Seymour, of Dartmoor, Great Britain, for Improved Artificial Fuel:

I claim the composition for an artificial fuel, made of the ingredients and in the manner and proportions herein set forth.

36,306.—Aaron Smith, of Brooklyn (E. D.), N. Y., for Improved Gas Regulator:

I claim combining the throttle or other balanced valve, E, and floating inverted cup, D, by the arrangement of passages, C c k k, and crank connections, h h k k, substantially as herein described.

36,308.—P. A. Stecher, of New York City, for Improved Lamp Shade Holder:

I claim a lamp shade holder, A, constructed and applied, substantially as herein shown and described.

36,318.—G. W. Woodworth, of Cleveland, Ohio, for Improvement in Water Elevators:

I claim the combination of the flat places, A, and inverted arch or section of a circle, B, with the bars forming the perimenter which connects the forks, as above described.

36,319.—Edwin Baily (assignor to himself and Henry McShane), of Baltimore, Md., for Improvement in Cut Offs for Hydrants:

I claim the combination of the spring cut off, d, with the series of openings or perforations, a, for the purpose of gradually shutting off the through flow of water, to prevent jarring and breaking of pipes, substantially as described.

36,323.—C. D. Spears, of Lisbon, Maine, assignor to himself and F. Buckman, of Bowdoinham, Maine, for Improvement in Water Wheels:

I claim, first, The penstock, A, and the scroll, B, the latter being placed within the former and constructed of segments, b, arranged eccentrically with the wheel, C, as shown in combination with the wheel, C, and central discharge opening, f, all arranged as and for the purpose set forth.

Second, The buckets, e, attached to the arms, d, of the wheel, C, in an oblique position, as shown and described, when said wheel thus constructed is used in combination with the scroll, B, penstock, A, and central discharge opening, f, as herein specified.

36,330.—W. H. Babcock, of Homer, N. Y., for Improvement in Water Elevators:

I claim the arrangement of the spring, K, projection, J, piece U V, and pawl, E e, for operation with the loose crank and ratchet wheel, and frictional surface, P, substantially in the manner herein set forth.

36,337.—C. M. Bromwich, of South Boston, Mass., for Draught Attachment for Lamp Boxes:

I claim the box, B, provided with an elevated chamber, C, in combination with a box, D, perforated at its upper and lower part, as shown at d c, and having a suspended box or deflector, E, within it, all arranged as shown, and used with or without the box, A, as and for the purpose herein set forth.

36,339.—G. F. J. Colburn, of Newark, N. J., for Improvement in Applying Reflectors to Lamps:

I claim the mode herein described of applying reflectors to lamps, for the purpose specified.

36,341.—Joseph Defossez, of Paris, France, for Improvement in Safety Lamps:

I claim the pneumatic locking device, m n o, in combination with the oil reservoir, A, top plate, F, and chimney, D, all constructed and operating substantially in the manner and for the purpose herein shown and described.

36,348.—William Grover, of Holyoke, Mass., for Improved Gas Regulator:

I claim the combination with the oscillating pipe, D, and its fulcrums, j j, of the inverted cup, E, and its arms, k k, in the manner herein shown and described.

I also claim the arrangement of the fulcrums, j j, within the mercury cup, h, as herein shown and described.

36,356.—Prosper Monnet, of Lyons, France, for Improvement in Producing Aniline Colors:

I claim the within-described process of treating the hydrochlorates or other salts of aniline or toluidine with nitro-benzine, substantially in the manner and for the purposes specified.

36,357.—Prosper Monnet, of Lyons, France, for Improvement in the Manufacture of Aniline Colors:

I claim the within-described process of treating the red of aniline with methyline or wood spirit and nitric acid, substantially in the manner and for the purpose set forth.

36,365.—C. G. Puckett, of Cerro Gordo, Ind., for Improvements in Drain Valves for Pumps:

I claim the combination of the box, f, screw valve rod, c, valve, b, and pipe, a, with the pump stock, A, in the manner herein shown and described.

36,367.—F. J. Rebbeck and E. M. Davies, of Pittsburgh, Pa., for Improvement in Lamp Burners:

We claim the wick tube, D, provided with a hollow perforated cylinder, I, and encompassed by a case, K, having one or more openings, d, made in it and provided with a flanch, L, to receive the case or deflector, M, and draught chimney, N, when said parts are arranged to admit of the vertical sliding of either the wick tube or case so as to expose the upper end of the wick tube when necessary for the purpose of lighting or trimming the wick, and also to inclose fully the wick tube when the burner is in use, substantially as herein set forth.

36,371.—J. W. Schreiber, of New York City, for Improvement in Coal Oil Lanterns:

I claim the lamp, A, provided with a cylindrical rim or case, D, and a polygonal or corrugated flanch, F, in combination with the chimney, and the shirt or jacket, K, on or around the upper part of the latter, all arranged as and for the purpose herein set forth.

36,374.—A. J. Simpson and J. B. Currier, of Lowell, Mass., of Improvement in Lamp Burners:

We claim the flanch, G, having the cylinder, F, attached, the latter being fitted on the cone or deflector, D, as shown, so that it may turn freely thereon, and at the same time be prevented from being casually detached, in combination with the two openings, g h, made respectively in the cone and cylinder, all arranged as and for the purpose specified.

We further claim providing the flanch, G, with two curved slots, e e, and lips, c c, substantially as shown for securing the chimney to the flanch, and at the same time admit of the expansion of the chimney under the heat of the flame, as set forth.

36,380.—Joseph White and Angus Agnew, of Philadelphia, Pa., for Improvement in Coal Oil Lamps:

We claim the spreader, having in its top, a, an elongated opening and inclined or curved strips extending from the ends of the said opening to the upper edge of the wick tube, the whole being applied to the wick tube or cap of a coal oil lamp, as set forth for the purpose specified.

36,386.—C. W. Cahoon, of Portland, Maine, for Improvement in Lamps:

I claim the combination of the lamp head and handle, substantially as set forth.

I also claim the combination of the lamp head, handle, and vibrateable chimney holder, fitted with chimney fastenings, substantially as set forth.

I also claim the combination of the U-spring, chimney, fastening, and tongue, substantially as set forth.

I also claim the combination of a corrugated air screen and deflector, substantially as set forth.

36,397.—Lovett Eames, of Kalamazoo, Mich., for Improved Hydraulic Apparatus:

I claim, first, The piston, J, working in an upright cylinder, A, and so constructed that it will be acted upon in its upward stroke by the force of a head of water, and then allowed to descend by virtue of its own gravity, when the head is cut off, substantially as herein set forth.

Second, The water chest or divisional box, E, arranged below the main piston, J, at the bottom of the body of the machine, and furnished with a double disk valve, F, valve seats, f and c', and eduction chambers, substantially as herein set forth.

Third, Controlling and regulating the passage of the spent water below the piston, through said piston, by means of a loaded plate valve, H, or its equivalent, substantially as herein set forth.

Fourth, Cutting off the pressure under the piston, and its loaded valve at the instant the water has exerted its maximum force upon the piston, by means substantially as herein forth.

Fifth, Arranging above the piston, J, a force pump, when this pump receives its power from, is connected to, and operates in combination with, the mechanism in the body of the machine, substantially as herein shown.

Sixth, The central equalizing chamber which is immediately above the double valve, F, for regulating the flow of water to the piston, J, at the commencement of its upward stroke, substantially as herein set forth.

Seventh, Tripping the valve, k, by means of the extension jointed levers, l l, or their equivalents, as herein set forth.

Eighth, Cutting off the supply of water to the chamber, A, previously to the tripping of valve, k, by means of rod, K', and double valve, F, so that the double valve, F, can be driven firmly to its seats by the force of the head of water, essentially as set forth.

36,398.—Lovett Eames, of Kalamazoo, Mich., for Improved Water Engines:

I claim, first, So constructing and applying valves to a water engine that they will control both ports, and keep a space equal to the whole of one port open at all the time, essentially as herein described.

Second, The solid double-faced valves, L L', in the cylinder, G, valve seats, h h' i i', and ports, g g', arranged and combined with the cylinder, A, and its piston, E, substantially as and for the purposes herein set forth.

36,403.—C. W. Grannis, of Gowanda, N. Y., for Improved Condenser for Coal Oil Stills:

I claim a condenser which combines,

First, Sloping sides.

Second, An internal trough to catch and conduct the condensed vapors to an external conductor.

Third, An external spout or conductor passing through or in a trough of cold water, to conduct the condensed vapors to the worm or cooler.

Fourth, Jets of water or a body of cold water upon its outside, in combination with a caldron or still having a broad open top, upon which the condenser is fitted, forming a cover thereto, so that the vapors arising from the entire surface of the oil in the still may pass directly to the condenser, substantially as described.

36,404.—J. S. Gray, of New York City, for Improvement in Self-Generating Vapor Burners:

I claim the combination of a wick tube, a heater cap, a conductor, a jet and a mixing tube, when arranged and operating substantially in the manner herein described.

I also claim the combination of a jet, a mixing tube and an adjusting screw, when arranged and operating as described, for the purpose of regulating the relative proportions of air and vapor admitted to the burner tip, as set forth.

36,409.—Albert Johnson, of Putnam, Conn., for Improvement in Water Elevators:

I claim the crank box, E, placed loosely on the shaft, C, and provided with the slide or brake, H, spring, I, pulley, e, and bar, L, in connection with the wheel, D, attached permanently to the shaft, C, and placed within the crank box, all being arranged to operate substantially as and for the purpose set forth.

I further claim the graduating of the pressure of the slide or brake, H, on the wheel, D, by means of the bar, J, adjusted by the screw, K, so as to regulate the strength of the spring, I, but this I claim only when used in combination with the crank box, E, and the mechanism contained within the purpose specified.

36,410.—E. B. Jucket, of New Haven, Conn., for Improvement in Hose Couplings:

I claim the conical screw ring, D, and nut, E, constructed substantially as described, in combination with hose couplings, in the manner and for the purpose as herein set forth.

36,413.—William Kuebler and Henry Beierlein, of Philadelphia, Pa., for Improvement in Lamps:

We claim the described burner for coal oil lamps without a chimney, in which the gas-condensing chamber, d, is provided with an internal bottom flange, g, the position of g and its proportionate size of opening being in relation to the wick, arranged as set forth.

We also claim the slitted gas condenser, d, combining with the internal bottom flange, g, the slitted top as set forth, when the slit, l, is shaped and situated in relation to the slit, v, in the draft chamber, e, as herein set forth.

36,415.—Adolphus Lind, of San Francisco, Cal., for Improvement in Water Wheels:

I claim the employment of two sets of buckets, c c d d, and separating flange, C, in combination with the drum, A, and the drum, E, recessed to receive said buckets; the said parts being arranged and operating together in the manner herein shown and described.

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THE AUBIN GAS-WORKS COMPANY, OF ALBANY, N. Y., have adapted their Works to petroleum and the heavy oil obtained from its distillation. Parties desiring information will be referred to Village Gas-Works thus adapted, where the ordinary yield of gas is from 150 to 200 cubic feet per gallon of oil. This yield, and the great improvements which experience has added to the Aubin Works, enable them to make a rich gas at a low cost—the only way to compete with kerosene.

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FREEZING OF GAS-PIPES.—Walton's Patent Anti-Freezing Apparatus illustrated by Engravings in the AMERICAN GAS-LIGHT JOURNAL, of Jan. 1, 1861, page 212, is the most simple, durable and efficient of any known process.

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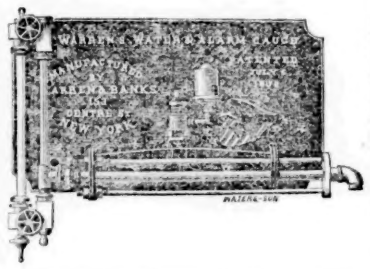

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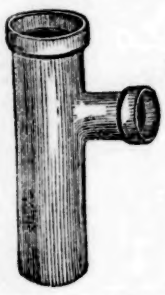

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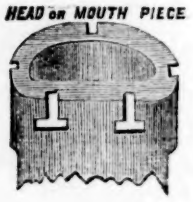

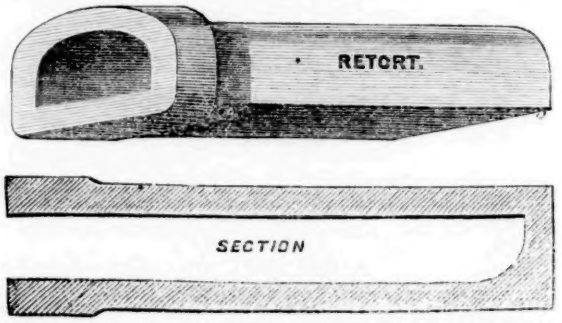

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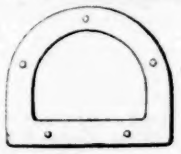

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POTTS' REVOLVING SIGNAL LIGHTS,

PATENTED SEPTEMBER 8, 1857.

Mr. ALBERT POTTS, the well known Inventor of the LAMP POST LETTER BOXES, which have been adopted by the Post Office Department for the large cities of the United States—and also of the GAS METER BOX, to be set in the front walls of houses, thus doing away with visits from Gas Inspectors, or burglars in gas-clothing, has lately brought forward a third Invention, which in point of importance and world-wide usefulness, surpasses the others entirely.

These SIGNAL LIGHTS are intended for use on Vessels propelled by Steam, and those exclusively. They specially indicate the presence of a Steamer, and by their use, there will be less likelihood of mistakes, and consequent collision than at present. They are also intended for SIGNALLING AT NIGHT, and can be used for that purpose UNDER ANY CODE of SIGNALS NOW ARRANGED FOR FLAGS.

This Improvement in Lights for Steam Vessels, consists in having the Lanterns containing the colored lights, connected by means of a series of cogged gearing with some convenient part of the Engine or Machinery, so as to cause them to have a revolving motion around their axis. On side wheel steamers, the Lanterns should be placed directly over the wheel-houses, and the power, or motion to turn them, may then be very conveniently obtained from the paddle wheel shaft. On Propellers, the Lanterns should be placed on each side of the Pilot House, or hurricane deck, and the rotary motion derived from any convenient or suitable part of the Engine or Propeller Shaft. Each Lantern is supported on the end of movable cranes, so that their relative positions may be changed and properly adjusted to suit the view of observers on either side of the vessel at the time of signalling.

The Lanterns to be used in this improvement may be constructed for Burning Oils, Fluids, Gas, or any of the known modes of illumination, and should be furnished with one or more lenses and reflectors, so as to concentrate the rays of light, and project them over the horizon with the greatest intensity. The lenses for this purpose should be made with colored glass, viz., Red and Green, and the position of the respective Lanterns, according to the color of the lenses therein, must be placed on the sides of the vessel so as to answer to the requirements of Rules and Regulations made and published by the Supervising Inspectors of Steamboats, agreeably to the Act of Congress of the United States in such cases made and provided. That is to say—by said Regulation—the Lantern having the green lenses for producing the Green Colored Light, must be placed on the starboard side of the vessel, and the other Lantern producing the Red Light, to be placed on the port side thereof In pursuance, also, of the aforesaid Rules and Regulations, there is to be found in board and behind each Lantern, a screen to answer the purposes therein mentioned.

The cogged gearing, by which the Lanterns are connected with the Engine or paddle wheel shaft, and thereby caused to revolve when the Engine is in motion, is so arranged that the connection may be readily shipped or unshipped, and the lanterns made stationary or otherwise, at the pleasure of the Pilot, or those whose duty it may be to operate and attend to the same. The cranes on which the Lanterns are placed, are also rigged so as to be readily turned horizontally from one position to another, so as to present one or both lights to the view of observers when laying athwart ships at the time of signalling

On the Use and Application of the Improvement for Night Signals.

When the vessel is under weigh, or going ahead in its course, the Lanterns are to be placed directly athwart ships, so that such colored light therein will then have the position and place prescribed by Rule Seventh of the aforesaid Supervising Inspectors of Steam Boats, and with the screens behind them, as above described, will then answer all the intents and purposes for which the colored lights are thus required to be used, as illustrated in the several diagrams published by said Inspectors for the working of a system of Colored Lights. The Lights in this case, according to the color seen by the observer, indicate the course or direction of the vessel whereon they are carried When the Lanterns with the colored lights therein, are made to revolve around on their axis, as proposed in this improvement, in addition to the signal above, another, and as we believe, very important and useful signal is thus formed, indicating that the vessel, whereon it is carried is a Steamer. In dark foggy nights, it is found by experience, to be somewhat of a difficult task to distinguish sailing vessels from Steamers and Propellers, especially when the latter are rigged, and carry a press of sail. When Steamers meet "head and Head," it is the duty of each to pass to the right, or, on the larboard side of the other. Whereas, when a Steamer meets a sailing vessel, the former must give way and allow the latter to pursue its course. Hence, to carry out the regulations of the said Steamboat Inspectors, and prevent collisions, it is important to have some infallible sign, whereby the character of the vessel may be readily seen and determined. Several very fatal collisions have recently taken place through mistakes of this kind.

On Signals for Speed and Distance.

The gearing of the Lanterns with the paddle wheel or propeller shaft, may be so arranged as to be an index of their speed. A very good proportion, would probably be to make the Laterns turn about one third as fast as said shaft. Hence, when the speed of the vessel is previously known, when making a certain number of revolutions of the paddle or propeller, it becomes an easy task from observing the time with which the Lanterns thereon may be turning to approximate to the speed with which the said vessel is moving at the time of observation. Again, as the arcs described by the rays of light from each lantern, as they revolve around on their axis, is greater in proportion to the distance from said lantern, so will the time in which said rays move over any given space, be less in the same proportion. Hence, when the lights are very remote, or far off, from the observer, the duration of each column or cylinder, of rays from each lense, would pass the eye of the observer, in a short space of time, or with great velocity. Whereas, at a nearer point of observation, the time of its passage would be considerably lengthened, or the motion thereof apparently much slower. From these facts, we believe the improvement is susceptible of indicating, in an approximate manner, the speed and distance of vessels whereon the revolving lights may be used.

On the Application of the Improvement for Marine Telegraphic Purposes.

The Revolving Lights can be readily applied to the general purposes of Marine Signalling at night, as follows: In order to show this application, we have adopted the Numbers as given in Roger's Code of Marine Day Signals, believing that work to be somewhat of a standard in matters of this kind. Instead of the flags used in the above code, for day signals, to indicate the combinations of two or more letters of the Alphabet, which combination is referable to certain numbers indicative of the words or sentences telegraphed, we propose to perform the same operation, at night, by means of the two revolving colored lights, so as to indicate the numbers directly to which the intended words or sentences to be telegraphed are referable. Thus, whether the vessel to be signalled is ahead, astern, or abaft the beam, the position of the two colored lights must be so adjusted, by means of the moveable cranes, whereon said lanterns or lights are fixed, that the two lights may be fully made visible to the observer. When both lights are thrown into this position, stopping the motion of the lanterns may be the signal for calling attention, or a rocket fired off, or the steam whistle blown, would answer the same purpose. Now, in order to represent the ten numerals, we propose to indicate them by the respective motions of the two colored lights, as follows:

RED LIGHT.				GREEN LIGHT.			
One Red,	Represents	Number	1.	Two Green,	Represents	Number	2.
Three	do.	do.	3.	Four	do.	do.	4.
Five	do.	do.	5.	Six	do.	do	6.
Seven	do.	do.	7.	Eight	do.	do.	8.
Nine	do.	do.	9.	One	do.	do.	0.

In the above arrangement, it will be seen that all the odd numbers are made by the Red Light, and the even numbers by the Green Light. In order to indicate the repeat of the last number, once or more times, or for other special purposes, which may hereafter be found useful and necessary, an even number of lights may be shown by the Red, and an odd number by the Green. It will be understood that when the Lanterns are made with three lenses in them, the numerals as above arranged are formed by the number of times a new light or lense is presented to the observer. Thus to indicate the number 3, the Red Light or Lantern would make one entire revolution; and to make the number 6, the Lantern carrying the Green Light would make two revolutions, and so on with the other numbers. When a symbol is made, the motion of the Lantern is to be suspended for a short time, and when a number expressing a sentence is formed, the lantern may be stopped for a longer period, or some one of the special signals above referred to, may be used for this purpose.

To show the application of this improvement as above mentioned, whereby these Lights can be used as readily for Night Signals, as Flags are used for Day Signals by the author of Roger's Code, we shall use the sign O colored red or green, according to the light used, to show the number of movements performed by the respective lights in order to represent any desired number of said code, suitable for the required purpose.

RED LIGHT.	GREEN LIGHT.
O, O, O, O, O,	
O, O, O, O, O, O, O.	
	O, O.
	O. O.

The above would represent the number 5722, and by reference to said Roger's Code, would be found to stand before the sentence:

"WILL YOU SHOW THE NUMBER THAT REPRESENTS YOUR NAME?"

RED LIGHT.	GREEN LIGHT.
O.	
O, O, O, O, O.	
O, O, O, O, O, O, O.	
	O, O.

Here the number expressed is 1572, and per the same Code, stands for

"WHERE ARE YOU BOUND?"

RED LIGHT.	GREEN LIGHT.
O.	
O, O, O, O, O, O, O, O, O.	
	O, O.
	O, O, O, O, O, O, O, O.

The number thus expressed is 1928, and per said Code is

"WHAT IS YOUR CARGO?"

RED LIGHT.	GREEN LIGHT.
O, O, O, O, O.	
	O, O, O, O, O, O.
	O.
O, O, O.	

Here the number expressed is 5603, and stands for

"HAVE YOU ANY NEWS?"

(RED LIGHT.)

Fig. 2

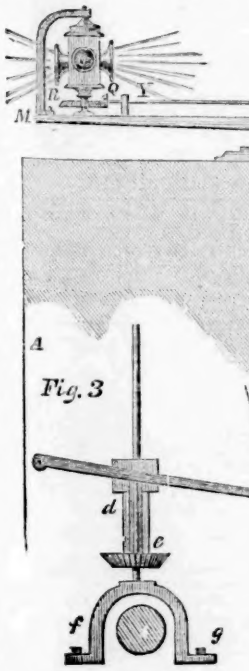

Fig. 3

(GREEN LIGHT)

Fig. 1

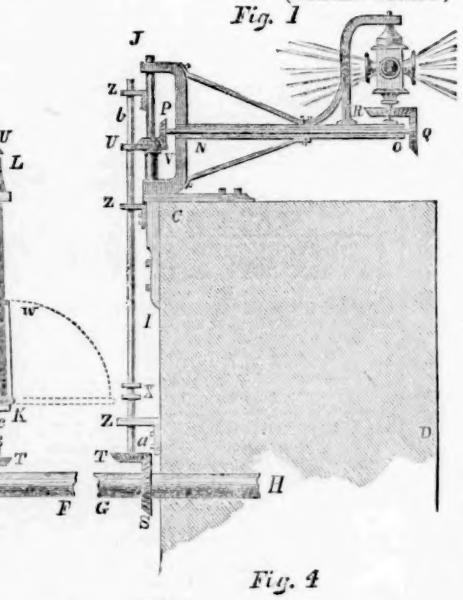

Fig. 4

MECHANICAL CONSTRUCTION.

In our engravings, Figs. 1 and 2, represent Vertical Sections through the wheel-house. In them E F and G H represent portions of the main Shaft. In Fig. 1, I J is a stout Iron or Wooden post, fastened against the side of the wheel-house, directly over the main shaft On the upper part of this post, is fitted the moveable arm or crane N O, to the main shaft is fitted the bevel wheel S, and to the lower end of the rod a b, is fitted a corresponding wheel T. U is a small pinion on a b, which gears with the spur wheel, V, which in turns gives motion to the wheels, P and Q, and so revolves the lamp R. It will be seen that a Rotary motion is given to the lamp, when the main shaft is in motion and a b connected.

It can be disconnected by a lever, acting between the bosses X, which will elevate the rod in the guides Z Z Z.

Fig. 2 is another arrangement, for the same purpose. In this, K L, represent a hollow Shaft, on which is firmly fastened, the arm L M, on which is the lantern. The hollow post is secured to the wheel-house by the straps K and B, and it can turn freely in them, the other part being the same in them as in fig. 1

The lever K W, when drawn down, will turn the frame in any required position around the Shaft c U. In fig. 1, the arm or crane N O, may be operated by cords from the wheel house, but in this device, the rod c U, does not lift up as in fig. 1, but in its place, the lower end is made square, and on it slides the short tube, d E shown in fig. 3. The lower end of the rod turns on a bridge, f g, spanning the main shaft. On the upper end of the tube, d e, a lever is attached by means of boxes and collars as shown in fig. 4. This lever when raised carries with it the beveled wheel T, thus disconnecting the gearing apparatus.

ALBERT POTTS, Patentee,
PHILADELPHIA, Pa.

PATENT BITUMINIZED PIPES,

For the Conveyance of Water, Gas, and Drainage.

This important invention, patented by Mr. Charles Newbold, and now for the first time introduced to the public, may confidently be stated to be one of the greatest interest and commercial value, as the Patent Bituminized Pipes possess all the qualities necessary for the conveyance of Water, Gas, Sewage, Mine-Pumps, &c., viz.: great strength, great durability, and inoxidability, with the immense advantage of being about *one fifth* the weight of iron pipes, and about 35 per cent. cheaper; whilst, compared with lead pipes, the Bituminized Pipes are only about *one fourth* their price, without the possibility of the formation of the oxide and carbonate of lead, so dangerous for every purpose. They will stand 150 degrees of Heat, and after many trials it has been satisfactorily proved that rats or vermin will not touch them. They also withstand the action of all acids and salts.

Iron pipes are at present frequently covered with a coating of bitumen or coal tar before they are laid down; but the adherence of this coating to the metal being very imperfect, on account of vibration and the difference of expansion, this preservation is insufficient, besides being exposed to a number of influences which neutralize its efficacy—galvanic currents materially assist the formation of oxides and deposits, which cause the obstruction and eventually the destruction of metallic pipes.

The Patent Bituminized Pipes are neutral, non-conductors of electricity, and consequently are not exposed to any of the deteriorating influences mentioned above. The process of manufacture of these Pipes consist in causing a roll of paper to pass through a reservoir of melted bitumen, after which it is tightly coiled around a mandril to any required thickness; and thus, when hardened, a tube is formed of perfect texture, great hardness, and enormous strength. These Pipes are proved, by hydraulic pressure, to resist a pressure of 220 lbs. to the square inch, equal to 506 feet head of water, which is more than double the altitude of the highest reservoir. The bituminous composition which unites and covers these Pipes is so well known as an excellent preservative, that it will be unnecessary to demonstrate that, when laid underground, the durability of the Patent Bituminized Pipes may be considered as unlimited. The Pipes are made in lengths of seven feet, and are connected by socket joints of the same material as the Pipes; or they can be fitted with iron flanged sockets, screwed together in a most simple and inexpensive manner.

For Gas these Pipes are invaluable; the Gas-lining which we insert effectualy resists the action of Gas, and being non-conductors, there can be no condensation in them, and the joints made with the Patent Cement are so strong as to entirely prevent Leakage.

The cost of laying the Pipe is also small, compared with those of iron, and can be done by mere laborers. The Bituminized Pipes have been in use the last three years, for the conveyance of gas and have been ascertained to be as perfect now as when first laid down.

DIRECTIONS FOR JOINING THE PATENT BITUMINIZED PIPES.

Pack the pipes level in the ordinary way; slip the collar over one of the pipes; draw the ends close together and warm them by putting a hot iron between them; then press them together so as to make them adhere; take a piece of iron wire netting, about half an inch in the mesh, a little narrower than the length of the collar, and long enough to wrap once round the pipe, spread the collar over it and the joining; close the ends with clay; pour the melted cement into the manhole of the collar, and fill up the interior space; then remove the clay and the joint is finished.

It is necessary to leave a small vent hole in the clay at each end of the collar to allow the air to escape as the cement is poured in, that there may be no flaws or air bubles in it when cold. If in cooling the cement settles in the manhole, fill up again.

N. B.—The cement should be broken into small pieces and melted in a pot as you do lead, at a low temperature, until it is dissolved; it must be stirred while melting; then take it off and keep stiring it as it cools until it becomes nearly as liquid as water; then pour quickly.

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J. McGEARY, AGENT;

or to FREDERICK W. BOND,
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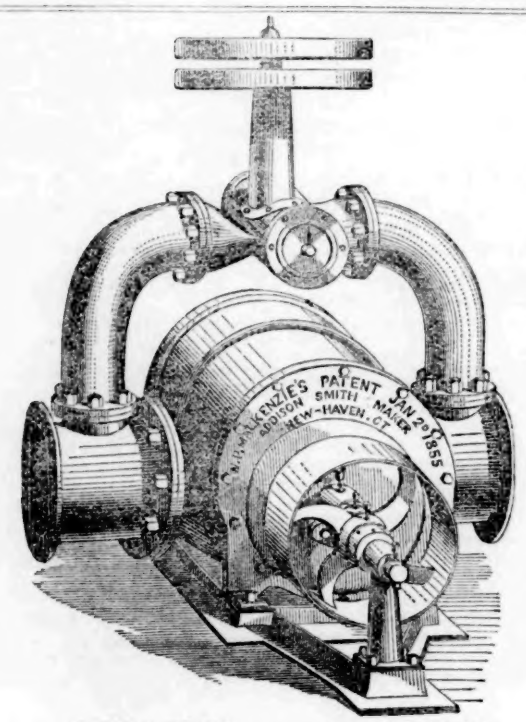

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AND

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